CHEMICAL MARKETS

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Price Maintenance

Exactly two years ago when Attorney General Donovan addressed the Chemical Industries Dinner, it appeared that a new era of sane and considerate competition was dawning. Sanctioned by the Government, the basic industries through their trade associations were to eliminate those unfair methods of business getting, so many of which are intimately associated with maintaining profitable prices.

In these difficult days our key industries find themselves in the thick of a bitter business battle, furiously hacking at prices. It seems a curious time for the Federal Trade Commission to choose for an investigation of the activities of those same trade associations which so short a time ago were semi-officially encouraged to help prevent the senseless and uncontrolled competition we now find on all sides.

Uncertainty as to what trade associations may, or may not, do legally appears to some as one of the plagues that worry executives today. Very broadly this is true, for these agencies have done good work and can do much more; but from the narrow point-of-view of price maintenance this is of minor consideration. It makes little difference whether, like the Fertilizer Association, the trade association has made clean competition one of its chief objectives or whether, like the Alcohol Institute, it has scrupulously avoided the subject of price control; the trade association has proved, in times of business stress, to be about as important as the Farm Trade Board to influence materially a downward price movement. In the case of basic industrial materials the old law of supply and demand, which it has been fashionable to consider a dead letter, has proved to be the final determining factor. The most our industrial leaders can hope successfully to accomplish in the face of such powerful economic forces is to prevent a price retreat from becoming an utter route by holding competitive selling within the bounds of good sense and fair play.

But that is a great deal. Much can be done in this direction, and no effort to maintain honest and logical competition should be counted in vain. It is very difficult to see how such efforts can be branded "restraint of trade" when they are so obviously powerless to allocate sales or to maintain prices. If, as many believe, we are to witness a long period of declining values, it is imperative for the stability of American business to maintain competition on a sound basis. The Federal Trade Commission in its recent move against trade associations is not helping this cause.

Pacific States

Romance and color portray these states, whose fabulous wealth lured even the earliest explorers.

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Replacement Logic

Many chemical plants, like Topsy, "just grew." The demands made upon the chemical industry in the last ten years have been far above the most optimistic expectations, and consequently not enough time or thought has been given to the most economical and efficient expansions of the plant. Both buildings and the layout of the equipment within the buildings are more often the result of immediate expediency than good foresight and intelligent planning based on the interrelationship of one producing unit to the others. Further, building costs were unduly high and some justification existed for holding in abeyance any broad constructive policy of rearrangement for greater economical operation.

The chemical manufacturer who is saddled with such a plant has now a wonderful opportunity to correct and improve buildings and equipment. Replacement costs to-day are well below the figures for the past twenty years' average. Producers would do well to grasp at this time this opportunity of modernizing present layouts.

If signs and portents mean anything at all, they point to a coming ten years more highly competitive than the last decade. Translating this into building and equipment terms, it means that the manufacture with the best layout and the most efficient machinery will stand the gaff the longest. It is not too much to say that the high cost producer five years from now will be the one who lacked the necessary vision to rebuild and re-equip now, while the low cost, successful manufacturer will be the one who saw in this temporary business lull an opportunity to purchase and build at favorable prices.

Visible Industrial Chemical Growth

It requires such an event as the 13th Exposition of Chemical Industries to focus attention on our remarkable chemical growth. The chemical industries of this country annually turn out products valued at $3,000,000,000 or more—a total reached for the first time in 1927, and representing an increase of 185 per cent since 1914.

In one year, this great group of industries spends for raw materials over $1,000,000,000 and probably one-fourth to one-third as much for equipment—for as it is well known in the chemical industries replacements of equipment are heavy. Raw materials, equipment and finished products—these three classifications cover the exhibits of the Exposition, and taken together, constitute a market of around $4,250,000,000.

Other statistics that are rather startling. The estimated investment is in excess of $10,000,000,000; the number of employees in round numbers, a quarter of a million, receiving over $310,000,000 in wages annually. A comparison of either total investment, or value of products produced annually, with the number employed in the chemical industry, as against most other industries, shows strictly an industry of mass production. With raw materials first and equipment second in the total cost of producing industrial chemicals and labor last, it is quite obvious where the chemical market-place is and where the majority of the chemical manufacturers' dollars are spent. The Chemical Exposition is more than a meeting place. It is a medium of bringing together buyers and sellers of over $4,000,000,000 of chemicals and equipment; a worthwhile part of this huge sum is either spent here or the contacts made for future business.

Breaking down the chemical industry and analyzing its component parts shows that the value of industrial chemicals and paints and varnishes is in excess of $500,000,000 for both groups, fertilizers, $200,000,000, coal-tar products, $100,000,000 of which nearly half represents finished dyes. Pessimists to the contrary, any industry that quadruples itself in fifteen years and rises to third, measured by capitalization, and fourth, on the value of its annual output, is a very desirable market to be in.

Financial Statements

Newspapers and trade journals in their financial pages are recording at great length the earnings, or lack of earnings, by our leading industrial corporations, covering the 1930 period. Placing too much emphasis on what was, or was not, done last year will seriously affect this year. What has transpired is done. No matter how much we talk about it we cannot change the past financial facts.

Most heavy chemical manufacture demands the maintenance of large reserve stocks of raw materials. When values of such commodities are going down, the losses that must be assumed to have been irretrievably lost are sometimes gained again when the price swing turns in the opposite direction. Thus the very thing that makes one year's statement look particularly "red" will be the reason for its looking "black" when conditions improve. The casual reader of financial statements may erroneously assume that lowered volume of

sales, and lower selling prices are the sole reasons for a drop of so many dollars and cents in earnings per share. In this way a warped view of the actual volume of trade is arrived at, which from a psychological viewpoint is not encouraging to a revival of business. It would be enlightening to know of the alcohol industry's losses, for example, what percentage of loss was due to smaller volume, to lower prices and to write-off of inventory. The first two are lost forever, but a certain part of the last will be retrieved at a later date.

Common Carriers Very seldom do we feel constrained to take up the cudgels for another industry but in this complex business structure that we have reared quite often the tribulations of one industry vitally affects the welfare of others. Just this situation confronts us with the railroad problem.

We believe that the great mass of American citizens little appreciate the seriousness of this condition and how vital it is that some satisfactory solution be found before it is too late and we are faced with a breakdown in the transport facilities. We are rapidly taxing the railroads out of existence. We suppose if the railroads were to be consulted, they would rather prefer to die from the effects of being slowly suffocated from too much legislation. In the end, however, the final result is the same—bankrupt properties and a country adversely affected. When the general public is aroused to the unfairness of taxing every inch of railroad property and permitting busses and trucks to use the public highways at will, and further, when they are properly aroused to the seriousness of the final act of such confiscatory practices, perhaps a fair readjustment will be made.

The industrial chemical industry has a very important interest in the railroads of this country. Generally speaking, chemicals are bulky and relatively cheap, the very type of commodity that requires railroad transportation almost exclusively. It is unnecessary, we believe, to point out to the members of the chemical industry the selfish necessity of lending cooperation to any plan that is fair and equitable and promises to continue indefinitely the high standard of service that the railroads have erected since they were turned back ten years ago in a complete state of demoralization after two years of governmental operation.

Quotation Marks

Fundamentally, chemistry is no different than any other profession, and there comes a time when chemistry having carried one as far as possible in arriving at the real reason why certain very apparent conditions exist must be laid aside and a theory evolved to account for conditions which a chemical examination has rendered apparent.—*American Dyestuffs Reporter.*

A duty on crude oil might be expected to injure refiners and deprive some of their employes of their jobs. Otherwise, it would be as effective as the present duty of 42 cents a bushel on wheat.—*Wall Street Journal.*

The only valuable statement of a business is a plotted diagram of expenses, receipts and profits, accompanied by a plotted diagram showing each individual item of expense and a plotted diagram showing the sources of his receipts, all through a long period of time.—*Textile Colorist.*

The anticipated competition in nitrogen is beginning to appear in small shipments moving out of the usual trade channels. There will be much more of this originating in countries where nitrogen is a political factor as well as a fertilizer.—*The American Fertilizer.*

When it comes to books, the scientists are in a bad position. They must have books, ever newer books, better illustrated ones, and more complete reference works. There are few classes of really useful books which cost so much to manufacture and there are few groups of workers who find book purchases more difficult to make.—*Industrial and Engineering Chemistry.*

I have never yet found satisfaction in devoting any time to doing nothing.—*Major George Haven Putnam.*

Fifteen Years Ago

(From our issue of May, 1916)

The Air Reduction Co. reports net profit for the year ending December 30, 1920 of $110,347.

The 1920 presentation of the Nichols Medal is made to Dr. Gilbert N. Lewis of the University of California by Dr. John E. Teeple.

Senate passes the Knox dyestuff amendment for emergency protection to the infant dye industry.

Directors of the Aetna Explosives plan a merger with the Hercules Powder Co.

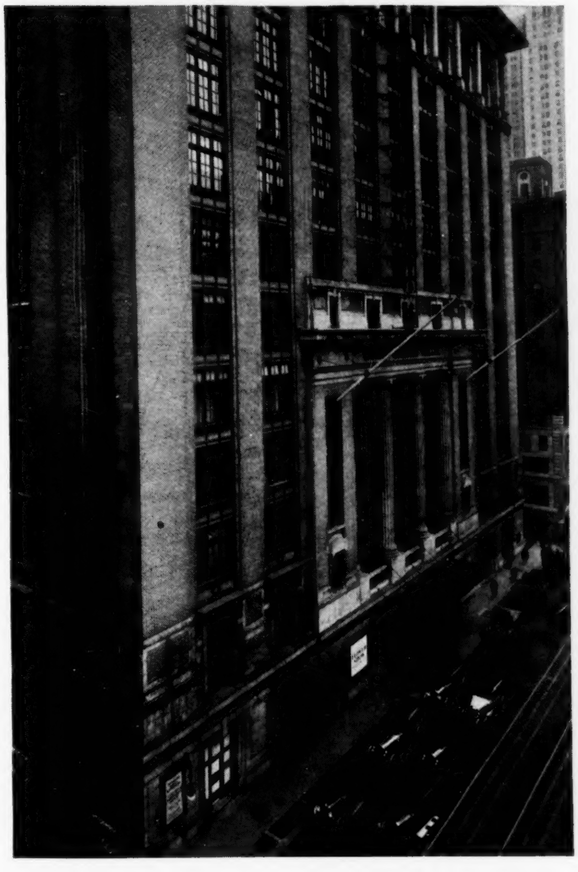
The Monsanto Chemical Works increases the common stock of the company from $700,000 to $3,500,000.

Joseph H. Choate Jr., speaks on the dye industry and the tariff before the United States Chamber of Commerce at Atlantic City.

The Chemical Showroom

The When, Where and Why of Thirteen Expositions

An Interview with Charles F. Roth



Every two years Chemical America gathers at The Grand Central Palace in New York City to learn the latest developments in chemicals and process equipment

The Chemical Exposition is a great deal more than merely a place for the physical display of exhibits. It is a live, vital compelling force in the chemical life of the Nation. Within its confines many of the most noteworthy advances have been conceived and nurtured to maturity. To talk with Charles F. Roth, Manager of The 13th Exposition and directing genius of the past twelve, is to learn of the intimate struggle to build to greater heights the industrial chemical industry in America.

"WHY, when and where was the idea of the Chemical Exposition first conceived?" This single question proved sufficient to draw from Charles F. Roth, Manager of the 13th Exposition the complete story of thirteen chemical expositions without any further need of promptings.

"About the beginning of the World War in 1914," this was the way Mr. Roth fixed the date, "Dr. William M. Grosvenor was in charge of the library of the Chemists Club in New York City. To increase its usefulness he gathered around him several of the younger men who agreed to spend one evening a week as librarians. I was one of these. These men, as a group, were impressed by the number of requests for definite information as to where this type of equipment or that particular new chemical material might be bought. Lack of a definite clearing house of information became even more acute when the sorely pressed Allies turned to us for chemicals for war purposes. Slowly the idea evolved itself in my mind of an exposition, a common meeting place where the producer of chemicals could show his products and the equipment manufacturer could acquaint the chemical and allied industries with the latest developments in large-scale production methods."

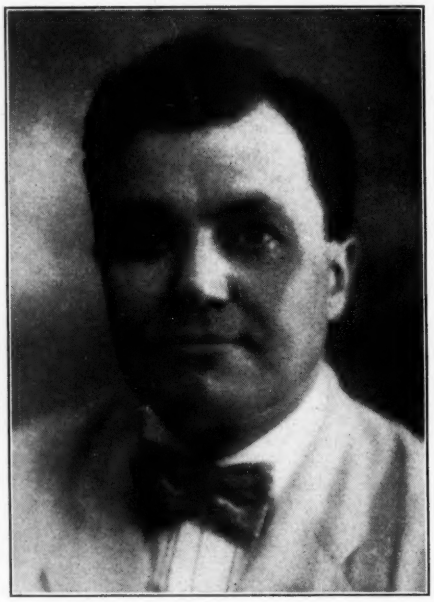
Roth, sounding out prominent chemists and executives on the wisdom and feasibility of his idea, received encouragement from all, and from many, some worthwhile suggestions.

"In the uncertainty that always surrounds the beginnings of any novel suggestion, several plans were offered and fully discussed, one after another various organizations were sugsuggested under whose auspices the exposition might be held. When these and others were rejected I and those closely connected with the idea solicited the cooperation of the management of the International Exposition Company and receiving encouragement, decided to go ahead. An Advisory Committee was formed whose cooperation proved invaluable. The membership of this group was originally Charles H. Herty, Chairman,

Raymond F. Bacon, Arthur D. Little, R. P. Perry, T. B. Wagner, and Henry B. Faber. Bernard C. Hesse, L. H. Baekeland and M. C. Whitaker rendered sterling services.

"One can easily visualize with what misgivings and apprehension the first attempt was viewed by its sponsors. The first Chemical Exposition was opened at the Grand Central Palace on September 20, 1915, with eighty-three exhibitors and was pronounced by the press, general public, and the industry a definite success. Sixty-three thousand people attended."

"The First Exposition helped awaken the public to the importance of a chemical industry adequate for our needs, and the contacts established aided in making the country "chemically-minded." Of even greater immediate importance was the demonstration to consumers of chemicals and the users of chemical equipment that our industries were able to supply our requirements of many essentials for which we had been looking to Europe. During the first Exposition, several societies held meetings initiating a custom that has grown and which has proven to be a valuable adjunct.



Charles F. Roth
Manager of the 13th Exposition of Chemical Industries

"With the need of the Exposition demonstrated, steps were taken at once to form the temporary Advisory Committee into a permanent and self-perpetuating body. This was done at a dinner held to celebrate the success of the idea. The Thirteenth Exposition is today under the supervision of a similar advisory body and of the original committee A. D. Little, as chairman, L. H. Baekeland, Raymond F. Bacon, Henry B. Faber, Charles H. Herty and T. B. Wagner still serve actively.

Southern Section Started

"The Second Exposition was held at the Grand Central Palace in the fall of the following year. The exhibitors increased from eighty-three to one hundred and eighty-eight and the attendance from 63,000 to 80,000. The idea of a Chemical Exposition had firmly established itself.

"One of the most important steps yet to be undertaken was at least started at the Second Exposition. The late Mr. Richard H. Edmonds, editor of *The Manufacturer's Record* and one of the leaders in the industrialization of the South perceived the tremendous latent possibilities of that region for the manufacture of basic chemicals. The result of his cooperation was the establishment of a Southern Section which has continued with but two interruptions during the period of Government Control of the railroads in 1919 and 1920. The Second Show is to be remembered also for the formation of a Technical Section of the American Pulp & Paper Industry (T.A.P.P.I.) and the holding of one of the general meetings of the American Chemical Society and also a meeting of the American Electrochemical Society.

"The Third Exposition found us at war, requiring huge supplies of chemicals and facing acute shortages of many essentials. This was specially true of the dye situation. The Chemical Exposition here performed a real service, acting as a medium of exchange of information, and bringing together under one roof the combined chemical resources of the Nation and also providing the requisite meeting place for chemical leaders to gather. The 1917 Exposition and the one held in the following year were perhaps the most important of the series, coming as they did at a time when we were involved in the greatest struggle of all history. Attendance figures rose to 97,000 and the number of exhibitors in 1917 was 288. The Southern Section was continued and two new ones established, Canadian Resources and Fuel Economy. At this Exposition a meeting of the Chemistry Section of the National Research Council was held which was closed to the public and much was accomplished in coordinating and simplifying the chemical industry's war activities.

Conference Between Banker and Chemist

"Another feature of the 1917 Exposition, and one which was widely attended, was the 'Conference between Chemist and Banker' where Dr. Arthur D. Little represented the chemist and George A. O'Rielly, the banker.

"Under the impetus of a year and a half of war activity the Fourth Exposition was attended by 110,514 people viewing 334 exhibits. In addition to the various sections already established, provision was made for a Ceramics Section. The program was largely devoted to symposiums on the development of our chemical industry since 1914 in the fields of acids, potash, industrial organic chemistry, and the application of chemical engineering to mass production. The amazing and spectacular growth of the chemical industry spurred on by the unusual war demands was at once apparent when comparison was made with previous expositions, even with the one held but one year earlier. The Fifth Exposition

(1919) was the first of two of the entire series not to be held in the Grand Central Palace. The War Department had requisitioned the building for use as a base hospital and clearing station for the return of our wounded from abroad. Accordingly, the middle west was invaded and the Exposition held at the Coliseum in Chicago attended by eleven thousand six hundred and twenty-seven persons who viewed 351 exhibits.

"The following year (1920) the Exposition was back again at the Grand Central Palace and was attended by the second largest number that have ever viewed the exhibits. The official attendance figures were announced as 126,317 and the number of exhibitors 437. The most prominent function performed this year was the recording in a practical way the remarkable advances made in the dyestuffs field in the previous five-year period and the introduction of symposiums on such vitally important subjects as Industrial Management, Materials Handling, Chemical Engineering, and Ceramics.

Twice in its history the Exposition has been forced to leave the Grand Central Palace. In 1919 when the building was taken over for use as a hospital for soldiers returning from France and again in 1921 when plans were made to change the Palace into an office building. Above, the Exposition at the 8th Coast Artillery Armory in New York in 1921

"In 1921 the Exposition was forced to move again. The owners of the Grand Central Palace had determined to change the property into an office building and so the 8th Coast Artillery Armory in New York City was finally secured. In many ways the Seventh Exposition stands apart for the number of interesting innovations. The military surroundings and with the Exposition staged on one floor the sight was inspiring and served to portray as no word picture could, the size of the chemical industry. Members of the newly created Tariff Commission and several members of both houses of Congress expressed frank amazement when viewing the exhibits from the advantage point of the elevated balcony. Little had they previously realized how the chemical field had expanded.

Exposition Again Returns to Palace

"The Southern Section was resumed; a Material Handling Section and a Container Section were inaugurated; and symposiums held on The Power Plant and American Dyes and Colors; programs for college students and industrialists were instituted; the first Chemical Industries Banquet was held; and a Paint and Varnish Program introduced.

"In 1922 the Exposition returned to the Grand Central Palace and a record for all time was made in attendance, 128,375 persons viewing 396 exhibits. The slight drop in exhibitors was caused by lifting out the Fuel Economy Section, the nucleus of an Exposition of Power, held December, 1922, and of the Paper Section made into the Paper Industries Exposition, April, 1923. The Chemical Industries Dinner was continued and the Exposition further featured by a meeting of the newly formed Synthetic Organic Chemical Manufacturers' Association.

"At the request of exhibitors admissions to the Ninth Exposition were restricted to those definitely associated with chemical fields. As a result attendance figures dropped to 82,668. Most of the first floor was given over to a complete refutation of the then existing prejudice against American-made dyes because of their alleged lack of permanency. These exhibits collectively were proof of the emancipation of this country from foreign sources of supply for most essential dyes. At the close of the Ninth Exposition it was decided to hold future ones every other year rather than annually and accordingly the Tenth was held in 1925. Attendance was further restricted and the figure declined to 67,836. The Canadian Section was resumed and a Laboratory Equipment Section added. The features were the establishment of a 'Court of Chemical Achievement' and a special section devoted to the synthetic yarn industry and its problems entitled 'Chemistry's Contribution to the Textile Industry.' The American Chemical Society appointed Marston T. Bogart, chairman, C. M. Stine, E. R. Weidlein, F. W. Willard and John Johnson as a committee to review the noteworthy achievements of the previous two-year period for the Court of Chemical Achievement. Exhibits of these were given in a special section calling direct attention to the advances being made in industrial chemical America. The Tenth Exposition was also the occasion of the first international meeting between members of the American Chemical Society and the Society of Chemical Industry of England. In conjunction with the special display of synthetic yarns the National Association of Finishers of Cotton Fabrics decided to hold their annual meeting.

"The Eleventh Exposition, held in 1927, and the Twelfth, held in 1929, witnessed splendid increases in both the number of visitors as well as the number of exhibitors. From the low point of 1925, when attendance figures totaled 67,836, the Exposition attracted 75,145 in 1927, and 80,027 in 1929, while the list of exhibitors grew from 308 in 1925 to 382 in 1929 and but fifty-five below the record for all time made in 1920. When one considers the consolidations of the last decade it is quite evident that the curve of progress is decidedly upward and that each succeeding Exposition is greater and more representative."

But the Expositions, as Mr. Roth pointed out, have performed a much greater service than merely to provide an exhibit of the wares of the chemical producer and the manufacturer of equipment.

"The one thought required for a proper understanding of our work and the one thought that I would like to place before the executives of the industry," said Mr. Roth in concluding his interview, "is that the Chemical Exposition is an active part of the industrial chemical picture every day of the year—not merely an incident in its existence occurring once every two years." He paused for a moment. "I have been glad to summarize some of the outstanding accomplishments in the fifteen or sixteen years of the Exposition which are perhaps not generally known and are not fully appreciated. The Southern Section has helped the South become a center of chemical manufacturing activity of ever increasing importance. Through the physical display of the industry's achievements the former prejudice of the man of finance has largely been dispelled. By permitting the general public to view displays such as the Court of Chemical Achievement a market for the securities of chemical companies has been made. The earlier Expositions focused attention on our dependence on foreign sources of supply of important chemicals such as nitrogen and potash, and served to aid in awakening a realization of the danger of such a situation and a desire to correct such conditions at the earliest possible moment. Under the leadership of such men as Professor W. T. Read the students of chemistry and chemical engineering have been brought into a closer contact with their future field of activity and have had given to them at a much earlier date, than they otherwise would have, a broad and comprehensive panorama view of the industrial chemical field. The real meaning of chemical engineering and the principles underlying the field of chemical engineering as applied to mass production have been greatly developed and enlarged because of the chemical exposition. Finally, the Exposition serves as a yardstick of comparison with chemical progress in other countries. To this I might add, it provides a common meeting ground where the chemical profession exchanges ideas, opinions and real knowledge."

Carbon Black in 1930

Carbon-black production increased to a new high level in 1930 when the total output amounted to 379,942,000 pounds, an increase over 1029 of 13,500,000 pounds, or 3.7 per cent, according to the United States Bureau of Mines, Department of Commerce. This increase, coming after a gain in output in 1929 of 47 per cent resulted in an oversupply with the result that stocks continued to mount and prices to fall.

Total sales of carbon-black to domestic and foreign buyers in 1930 amounted to 251 539,000 pounds, a decline from the previous year of 32,267,000 pounds, or 11 per cent, says G. R. Hopkins in a statistical abstract made for the Bureau. This decline was reflected in domestic sales and exports, both decreasing in about the same ratio.

Stocks, already high as the year opened, increased rapidly and on December 31, 1930 amounted to 259,245,000 pounds, or nearly double the total on hand January 1. A comparison of total deliveries in 1930, 251,539,000 pounds, with stocks indicates that the supply on hand more than equals the 1930 demand.

As already stated the oversupply of carbon-black in 1930 was reflected in prices, which fell off consistently. The average value per pound as reported by the producers for 1930 was 3.91 cents. This represents the lowest price recorded since the compilation of statistics was begun by the Bureau of Mines in 1919.

The estimated quantity of natural gas burned for the production of carbon-black in 1930 amounted to 266,471,000,000 cubic feet, a slight increase over 1929. The average recovery of carbon-black per thousand cubic feet of gas burned was 1.43 pounds, the highest recovery recorded since statistics were first compiled. The average yield of carbon-black has increased in most years, a notable exception being recorded in 1929, when a number of new plants in Texas commenced to operate. A factor in the increase in average yield in recent years has been the introduction of the retort process by which as much as 10 pounds per thousand cubic feet of gas have been obtained. However, the production of carbon black by processes other than the channel process showed a marked decline in 1930 which makes it probable that the increased yield was obtained irrespective of the development of retort processes.

Exports Show Decline

Exports of carbon-black declined from 91,829,000 pounds in 1929 to 84,260,000 pounds in 1930. These exports were valued at a total of $5,789,458. This represents an average value of 6.87 cents per pound, which though a material decline from the average export value in 1929, is still considerably above domestic prices. The United Kingdom continued to be the leading carbon-black customer with France second and Germany third.

The discovery that carbon-black could be used as a reinforcing agent in rubber was made in 1915 and since that time this use has been the dominating factor in the trade. The approximate distribution of carbon-black sales in 1930 was as follows: To rubber companies, 128,572,000 pounds, or 77 per cent; to ink companies, 19,220,000 pounds, or 11 per cent; to paint companies, 11,922,000 pounds or 7 per cent; for miscellaneous purposes, 7,565,000 pounds, or 5 per cent. These data indicates an increase in the relative importance of the use in rubber at the expense of consumption by the ink and paint industries.

The production of sodium compounds, not including common salt, from natural salines and brines in the United States in 1930, as indicated by sales or shipments by producers, amounted to 294,910 short tons valued at $6,879,529, it is announced by Scott Turner, Director, United States Bureau of Mines, Department of Commerce. These figures include the output of sodium carbonate (soda ash, sal soda and trona), sodium bicarbonate, sodium sulfate (salt cake and Glauber's salt), and sodium borate (borax and kernite), and show an increase in both quantity and value as compared with the output of 275,190 short tons valued at $6,107,666 in 1929.

The Chemical Schoolroom

The Three R's of the Industry

The chemical engineering student today is the leader of the industry tomorrow. Whether the subject of student courses is looked at from a broad viewpoint or from one considering the monetary return, the presence of the seriously minded student at the Exposition is highly desirable.

By W. T. Read*

READIN', 'riting and 'rithmetic—production, sales and finance—the three R's that the chemical executive of today wants to be certain the executive of tomorrow learns. Accordingly there are three objectives which are sought in making available to college and university students the educational resources of the Exposition of Chemical Industries. Two of the three, while quite important, are obvious and the results of their attainment are measurable. The third objective is not obvious and its results are not readily measurable, but it is by far the most important.

The first objective is that of the educator. He seeks to teach students some things about chemical raw materials and products, about materials of construction, and about unit operations and the equipment with which such operations are carried out, which he cannot teach in the class room or even by inspection trips. How nearly this objective is realized in measurable by reports and examinations.

The exhibitors at the Exposition have as their objective informing students about what they have to sell, not so much with a view towards immediate sales, but rather to get these students into the habit of attending Expositions, to lead them to think of the Expositions as valuable sources of information, and to make them trained, intelligent, and discriminating buyers. Even though the whole project of students' courses is young, and few of the students of past courses are yet buyers, a number of sales of very considerable magnitude have resulted.

The third objective is that of business executives, the men who direct the destinies of the great chemical industry of the United States. They have very little direct interest either in what exhibitors sell or what students learn. They are, however, deeply interested in students. The chemical industry which these executives have built in such a short time and in the face of such odds will pass in a few years into the hands of those who are college boys today. Naturally executives want to see these boys broadly trained, open minded, progressive, farsighted, and possessed of grit, determination, and enthusiasm. They have a right to ask what the Exposition can do for students that will make them more capable to carry on the chemical industry of tomorrow.

Just what the Exposition does for students above and beyond giving valuable information includes much that is intangible and much that defies measurement, but nevertheless much that is tremendously real, vital, and important. In being a guest of an Exposition that is primarily planned and arranged for technical, professional, and business men, the student feels himself subtly complimented and honored. He is being admitted to the great fraternity of those who make chemistry their main business in life, and he feels a glow of pride and satisfaction at beginning to be a part of all that the Exposition stands for. He gains a new vision of the vast scope and importance of chemical industry. He begins to think in different terms and attains a new level in his conception of the part chemistry plays in the business of the nation. Even those students who come from large universities in a chemical manufacturing region can gain a great deal. How much more the Exposition means to students from smaller institutions, to whom opportunities of seeing chemical industries are not available! It must be remembered that many very able men have their start in the smaller institutions.

This matter of impressions and of a new vision is the main reason for the lectures which are given at the students' courses. It is not primarily what these men say that counts most, even though they speak interestingly and authoritatively. It is the men themselves who count. They have been carefully selected to represent a cross section of leaders of the

*Dean, School of Chemistry, Rutgers University, Chairman, Exposition Students' Courses.

chemical profession. Some of these men are teachers in large institutions, but a very considerable number of them are men with whom students would otherwise make no contacts. The point of view and the inspiration which these men can give to students makes the series of lectures tremendously worth while.

The whole aim of the Exposition is to present new things in chemical industry, new materials, new products, and new ideas. Repeated contacts not only with recent achievements in chemical industry, but also with the men who are making these achievements possible, are bound to react to the advancement and improvement of students who are exposed to these influences. Long after the ideas which the students gain have been replaced by newer ideas, the vision and inspiration which this great Exposition gives will live and grow and bear fruit. At first the results will apparently all be for the benefit of the students and exhibitors, but in the years to come the greatest of all these fruits will be reaped by the American chemical industry.

The net result of the special and intensive training which these students are receiving will make them better able to meet the increasing exactions of business competition of the future and will provide chemists and chemically minded executives for the chemical manufacturers capable of creating and producing the products the future will demand. At once it will be appreciated that men far better and more intensively trained will be the leaders in all branches of science and industry in the next following generations.

Program of Student Courses

The following outline briefly summarizes the student activity in connection with the 13th Exposition of the Chemical Industries. The work this year has been divided into two courses, one elementary and the other for more advanced students. The speakers, leading men of the chemical and process equipment industries have been picked with great care.

First Course—Elementary Chemical Engineering

A general survey of the field of chemical engineering, including a comparison of unit operations and processes, handling of materials, transfer of heat, materials of construction, typical unit operations, and a consideration of chemical engineering as a career. Purpose: to answer the question, "What is Chemical Engineering?"

May 4, 3:00 P. M.

"Unit Operations Versus Processes." S. D. Kirkpatrick, Editor, *Chemical & Metallurgical Engineering*.

"Materials of Construction." W. S. Calcott, Associate Director of Research, E. I. du Pont de Nemours & Co.

"Transfer of Heat." W. H. McAdams, Professor of Chemical Engineering, Massachusetts Institute of Technology.

"Handling of Materials." Graham L. Montgomery, Managing Editor, *Food Industries*.

May 5, 9:00 A. M.

"Vaporization Processes, Evaporation, Distillation, Drying." Albert B. Newman, Professor of Chemical Engineering, Cooper Union.

"Agitation and Mixing." Kenneth S. Valentine, The Turbo Mixer Corp.

"Classifying and Thickening." Anthony Anable, Assistant to the President, The Dorr Co.

"Filtration." R. Gordon Walker, Vice-President, Oliver United Filters, Inc.

"Chemical Engineering as a Career." John C. Olsen, President, American Institute of Chemical Engineers.

Second Course—Advanced Chemical Engineering

Lectures covering the economic survey necessary for plant location, the principles of plant layout and development, progress in chemical engineering, what recent inventions have done for chemical industries, the relation of small-scale plant tests to large-scale development, and a thorough study of high-pressure technology and its place in chemical industry. Purpose: To bring the young chemical engineer in touch with modern trends and developments.

May 6, 9:00 A. M.

"Plant Layout and Development." Charles P. Wood, Lockwood, Green & Co.

"Small-Scale Experience for Large-Scale Development." J. V. N. Dorr, President, The Dorr Co.

"Progress in Vaporization Processes." Walter L. Badger, Professor of Chemical Engineering, University of Michigan.

"Recent Contributions of Science and Invention to Chemical Engineering." James R. Withrow, Professor of Chemical Engineering, Ohio State University.

May 7, 9:00 A. M.

"High Pressure in Chemical Engineering."

"General Survey of High-Pressure Progress." N. W. Krase, Associate Professor of Chemical Engineering, University of Illinois.

"High-Pressure Equilibria." B. F. Dodge, Associate Professor of Chemical Engineering, Yale University.

"Nitrogen Fixation." Charles O. Brown, Vice President, Nitrogen Engineering Corp.

"Alloys for High-Pressure and High-Temperature Operations." Edgar C. Bain, United States Steel Corp.

Third Course—Industrial Chemistry

A study of the career of the chemist; his relation to the world; his work in the plant, in cooperation with chemical engineers, in consulting practice, and in the legal side of chemical industry; the training of chemists in the university, in the plant, in industrial fellowships, and a consideration of the future of chemistry. Purpose: To survey the services and training of chemists.

May 8, 9:00 A. M.

"Looking Forward in Chemistry." Frank C. Whitmore, Dean, School of Chemistry and Physics, Pennsylvania State College.

"Cooperation between Chemists and Chemical Engineers." W. K. Lewis, Professor of Chemical Engineering, Massachusetts Institute of Technology.

"The Chemist in the Plant." Bert S. Taylor, The B. F. Goodrich Co.

"The Chemist as an Expert Witness." W. M. Grosvenor, Consultant.

May 9, 9:00 A. M.

"Training Chemists in the University." Neil E. Gordon, Editor, *Journal of Chemical Education*.

"Training Chemists in Industry." H. E. Elley, Director, Chemical Section, Dyestuffs Department, E. I. du Pont de Nemours & Co.

"Industrial Fellowships as a Training for Chemists." George D. Beal, Assistant Director, Mellon Institute of Industrial Research.

"The Chemist in the World's Work." H. E. Howe, Editor, *Industrial and Engineering Chemistry*.

"Chemistry as a Career." M. L. Crossley, Chief Chemist, The Calco Chemical Co.

Association News

The outstanding event in association news for April is of course the 81st meeting of the American Chemical Society held at Indianapolis, March 30 to April 3. A record attendance was again made despite the rather pessimistic viewpoint of many that the number would be considerably less. The number of and the quality of the papers was never higher and altogether the first meeting under Professor Moses Gomberg's chairmanship was highly successful. Looking forward, during the month of April the Salesman's Association and the societies that are cooperating in the management of the Chemical Industries Dinner were busy with plans for the affair scheduled for May 7, at the Hotel Roosevelt. Under the direction of Fred. A. Koch, President of the Salesman's Association, several sub-committees have been busy in perfecting the final arrangements and a record attendance is now confidently expected.

Alpha Chi Sigma Dinner

In connection with the Exposition the New York Professional Group of Alpha Chi Sigma is to hold a Chemical Exposition meeting Wednesday evening, May 6, at the Prince George Hotel, 14 East Twenty-eighth St., New York, N. Y. Dinner will be served promptly at 6:30 P. M. F. C. Whitmore is to be toastmaster and short talks are to be made by L. V. Redman, Stroud Jordan, R. S. McBride, W. T. Read, H. A. Curtis, and H. E. Howe.

Chemical Window-Shopping

One week of each two-year period the Chemical Industry "Shops" Grand Central Palace

The greatest difficulty in viewing an exhibition of the size of the Chemical Exposition is quite likely to be that of seeing too much, rather than too little. The average visitor cannot hope searchingly to investigate over four hundred exhibits although this course would be most desirable as each represents a definite gain to the industry's technical advancement. Therefore, unless some program is mapped out in advance, the visitor finds the Exposition a three-ring circus, confusing, somewhat bewildering. The attempt is made to see everything with the result that very little of real value is retained.

To prevent this, it is the part of wisdom to spend a little time in preparation. The Exposition is not a spectacle in the ordinary sense of the word. Therefore, some real effort on the part of the visitor is necessary to obtain a return in the fullest measure from the efforts of the chemical and process-equipment manufacturers in exhibiting. If possible, those attending the Exposition should make out in advance a list of the special exhibits, pieces of equipment, and men that should be seen. They should talk over with operating officials, and others likely to wish to have later the benefit of their representatives' attendance, the problems that are pressing for solution. With this groundwork laid, visitors are better equipped to arrange time and efforts intelligently. Even those who are not closely allied to the actual problems of operation will find this suggestion a time saver, and will leave the exhibit with a much clearer picture, if they will predetermine what they wish to see specially, and then if time permits make a general and, perforce, somewhat cursory examination of the remaining exhibits.

To help those planning to see the Exposition we have made what might be termed a preview of several leading exhibits. We have done a little chemical window-shopping in advance and summarize briefly several of the leading features. Space does not permit mention of all, or even a majority, of the exhibits, but those that are mentioned should not be missed under any circumstances.

The special sections, Southern, Canadian, Laboratory Supplies and Equipment, Materials Handling, and Containers are continued and enlarged. The time intervening between the last and the present Exposition has seen remarkable developments in the commercial introduction of processes requiring high pressures, the introduction of the so-called stainless steels to industrial problems and the further growth in plastics and synthetic resins. What might be termed the spectacular developments have been generally in these three fields.

The special fundamental operations utilized in the chemical industries such as disintegration, crushing, grinding, grading, mechanical separation, including filtration, classification, settling, thickening, evaporation, distillation, drying, weighing, measuring, mechanical handling of materials and conveying are shown, in most instances, by actual demonstration. The engineer with a problem coming under any of these classifications will find in the following exhibits the necessary technical experience to solve the most intricate and specialized operations. The Exposition is the meeting place for the exchange of ideas and information.

New and Novel Items of Interest

The Dorr Company (50-51) are showing, in addition to their usual line, a new classifier, embodying a radical improvement in mechanical design, which permits a wider range of operations; a closed-circuit, wet grinding of raw materials in the cement industry, providing a method of finer grinding, a cement low in free-lime content and high in early-strength; and new refinements in the layout and equipment of phosphoric acid plants of higher concentration. Of special interest to the pulp and paper industry is a new continuous causticizing system, and a new process for the continuous preparation of bis-sulfite liquor.

In the field of filtration, T. Shriver & Company (419-420) are showing in addition to their general line of filter presses a special

Raw Materials

Chemicals

Apparatus

Equipment

typeof diaphragm pumpwith mechanically supported diaphragms and a special design of cartridge filter.

While on the subject of pumps, there is at The Duriron Company exhibit (20) Number 50 in the Duriron family of pumps. It is suggested specially for unloading acids from tank cars, circulating tin tetrachloride and other solutions in bleaching and dyeing plants and for transferring and circulating solutions in wet metallurgical processes and in metal plating.

Abbe Engineering Company (89-90) is featuring a new Beach-Russ rotary vacuum pump operating either duplex single-stage for large volume, or two-stage for high vacuum. It is of special use in problems where despite large capacity quick evacuation is required. They are also featuring the new Blutergess Sifter which is sure to attract attention from engineers particularly interested in difficult sifting problems.

Colloidal Grinding

The question of colloidal grinding is one that involves a special technique and special equipment. Chemicolloid Laboratories (418) are showing a new junior model of the Charlotte mill. This is a standard 3,600 R. P. M. direct-connected motor and designed for plant research laboratories and colleges reaching colloidal chemistry. For commercial work the heavier duty machines are displayed.

Rubber continues to serve in many vital ways in the war against corrosion. To the engineer or chemist who is perplexed with a difficult situation of this sort the displays of The American Hard Rubber Company (257-259) B. F. Goodrich (45) and The Miller Rubber Products Company (87) are designed to graphically picture the possibilities in the use of rubber in mixing tanks, pipe-lines and in pumps.

Raymond Bros. Impact Pulverizer Co. (67) has brought to the Exposition three new additions to their line, a Midget Roller Mill, which is smaller than the regular size, but which embodies all of the principles of the latter; a complete #00 Screen Pulverizer and a small Mechanical Air Separator.

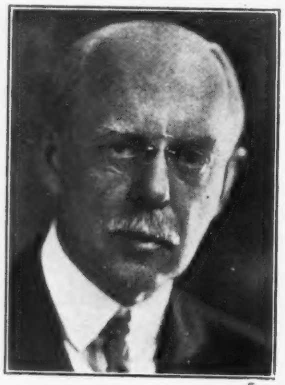
Ceramic Exhibits

The Ceramic industry has always been a very close ally of the industrial chemical field and the 13th Exposition contains several extremely interesting exhibits of pieces of equipment that are proving of inestimable value under very trying chemical engineering conditions. The General Ceramics Company's space (33) for example, contains a nitrating kettle, a suction filter, a centrifugal pump, boiling kettles, stills, acid elevator, and an exhauster, all splendid specimens of the industrial ceramic art. Some of the other stoneware exhibitors at the show are U. S. Stoneware, and Maurice A. Knight, the former placing special attention on electric churn mixers and hydrogen sulfide generators and the latter on several pieces of special manufacturing equipment.

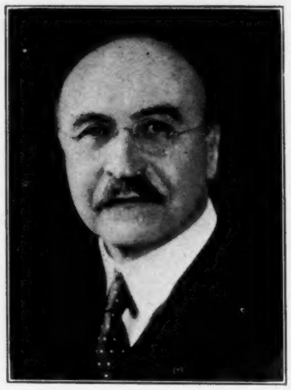
What lead now means to the chemical engineer is brought out very forcibly by the exhibit of the United Dry Docks, Inc., Tank Division (497) showing several tanks with bonded lead lined plates that can be welded electrically without melting the lead.

Unquestionably one of the outstanding developments in methods of drying is that of spray-drying. The Bowen Research Corporation (412) is taking particular pains to point out several of the advantages of this method, such as reasonable first cost, low operating cost, and the fact a new process is used which controls the cooling in a direct relationship to the speed with which the material drys, a vitally important phase wherever delicate materials are being handled.

Before passing over into the container section in search of the new and the novel, it is well to pause and seek out several of the exhibits that are showing the non-corrosive metals such as Haynes Stellite, (93); Carnegie Steel (92); International Nickel (9) and a few of the so-called stainless steel or allegheny metal producers and then visit such companies as The Blaw-

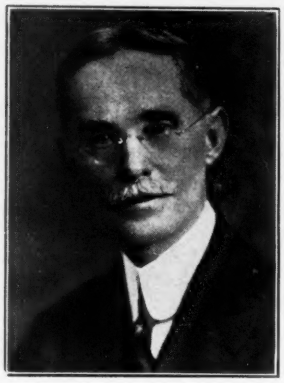


Arthur D. Little
Pres., Arthur D. Little, Inc.
Chairman



L. H. Baekeland
Hon. Prof. Chem. Eng.,
Columbia University

Charles F. Roth
Manager, 13th Exposition



Charles H. Herty
Industrial Consultant

R. Gordon Walker
Vice-Pres., Oliver United
Filters, Inc.

T. B. Wagner
Consulting Chemist

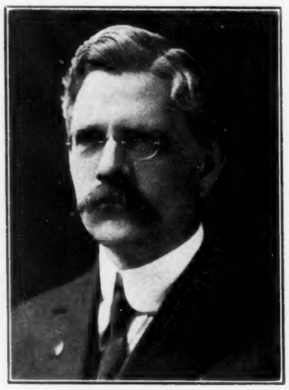
Advisory

Thirteenth

Chemical

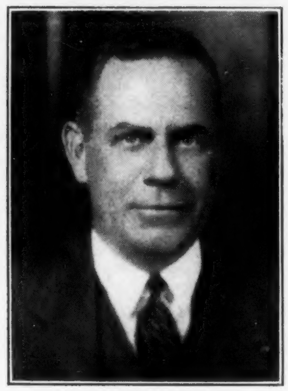
Fred A. Koch
Pres. Salesmen's Ass'n of
American Chemical Industry

Raymond F. Bacon
Consulting Chemist



John C. Olsen
Pres., American Institute of
Chemical Engineers

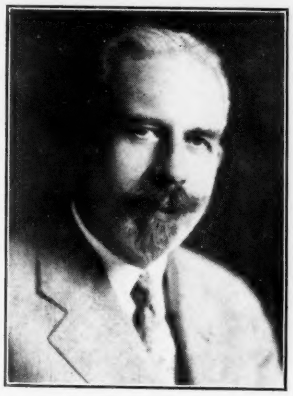
J. V. N. Dorr
Metallurgical and Chemical
Engineer



Williams Haynes
Editor and Publisher
"Chemical Markets"

Lammont du Pont
Pres., Manufacturing Chemists' Ass'n

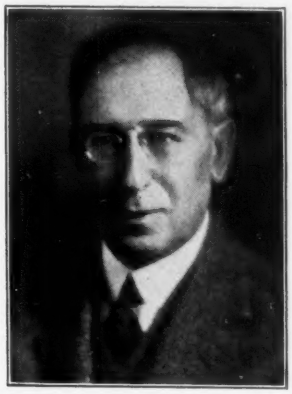
M. C. Whitaker
Consulting Chemist



H. E. Howe
Editor, "Industrial and Engineering Chemistry"

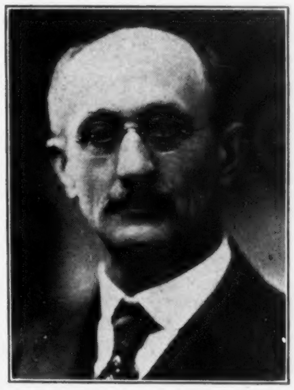
Fred W. Payne
Manager, 13th Exposition

Committee
Exposition
Industries



Moses Gomberg
Pres., American Chemical Society

H. J. Schnell
Gen. Mgr. "Oil, Paint, and Drug Reporter"



Louis Kahlenberg
Pres., Electrochemical Society

Sidney Kirkpatrick
Editor, "Chemical and Metallurgical Engineering"

Henry B. Faber
Consulting Chemist

David Wesson
Southern Cotton Oil Co.

L. V. Redman
Pres., The Chemists' Club


THE CALCO CHEMICAL CO
Calco
BOUND BROOK
NEW JERSEY
CALCO
ANILINE OIL

Knox Company (236); J. P. Devine Mfg. Co. (62) and the Buffalo Foundry and Machine Co. (5-6) to see and hear what these people are doing with these metals in the way of equipment for the chemical manufacturer to permit the use of high pressure or defeat the ravages of corrosion.

Container Section

The proper shipping of chemicals is just as important as their purity or physical properties. Often these are dependent upon the package. Carpenter Container Company (534) is showing a new drum that conforms to the I. C. C. 21-A specifications for shipping poisonous articles, oxidizing materials, and inflammable solids; also a specially treated drum for the shipment of semi-liquids, one for greases and emulsions, and another for liquid latex.

The Detroit Steel Barrel Company (502) has set up a very instructive display of the use of the metal container and should prove worth while to the chemical manufacturer who is faced with a shipping problem. To maintain strict neutrality and to make certain that a producer who is working with a packaging problem gathers together all of the pertinent facts, we suggest a visit to the booth of the Associated Cooperage Industries (549) where the case for the wooden barrel and the double arch problem is presented.

Permanency in Emulsions

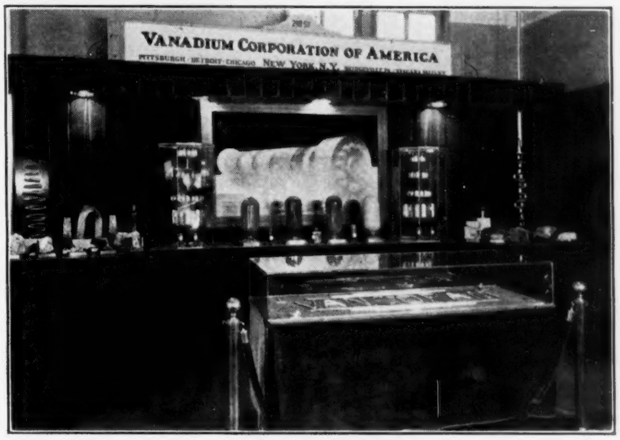
The question of emulsions has come in for a great deal of scientific investigation in the two years intervening between the 12th and 13th Expositions. Glyco Products Company (292) is exhibiting several products that are finding a continually widening sphere of application in the manufacture of permanent emulsions in water-proofing, lustering, polishes, cosmetics, disinfectants, sprays, inks and similar fields. Glyco is also interested in the development of the Rezinols, (polymerized terpenes) now being introduced for promoting adhesion in varnishes, lacquers and sealing compounds to tin, glass, and other smooth surfaces.

Producers of industrial chemicals who are exhibiting at the present Exposition are American British Chemical Supplies Inc., (493); Eastman Kodak, (56) specializing on cellulose acetate and organic chemicals; Electro-Bleaching Gas (11); Emery Industries (424); Hercules Powder (204-205); Hunkins-Willis Lime (325); Industrial Chemical Sales (88-87); International Salt (18); Kay-Fries Chemicals (493); Koppers Products (52); Niagara Alkali (11); Pfaltz & Bauer (268); Chas. Pfizer (38). Philadelphia Quartz (319-320), in addition to its complete line of silicates, is attracting special attention to the meta-silicate. The new developments in this chemical and its commercial significance is threatening to make serious inroads into many fields. It should be investigated. Sharples Solvents (59) is a co-exhibitor with Sharples Specialty Company, Vanadium's Booth (70) will be a mecca for a large number, in view of the new titanium dioxide and phosphate plant recently completed of the subsidiary company, Southern Mineral Products Corporation. Westvaco Chlorine is at booth 39.

The 13th Exposition of Chemical Industries is in every way a worthy successor of the preceding twelve. Attuned to the now pressing demand for further reduction of production costs the entire show is built around the idea of further economy of operation, that is, actual manufacturing and also in the substitution of mechanical handling for the expensive hand labor. The mechanical devices for conveying, handling and packaging on display at many of the booths are among the most interesting of the whole Exposition. One is impressed strongly with the belief that it is in these sections that most of the necessary economies needed in the next two years are likely to be discovered.

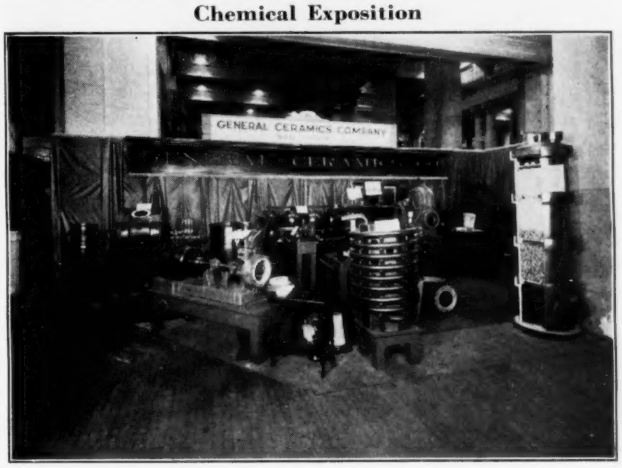
and Containers

Window-Shopping



at the

Chemical Exposition



Potash

Can the United States Free Itself of Foreign Dependence?

(Part III.)

By George Ward Stocking*

The discovery of potash deposits in the United States was of course of first importance. But of even greater importance is the question of whether or not these deposits are able to compete on a competitive basis with foreign sources of supply. In the concluding article of this series Professor Stocking analyzes the possibilities of the Permian Salt Basin of the Southwest from the economic viewpoint.

THE Permian Salt Basin of the Southwest extends northwest from western Texas and southeastern New Mexico across the Panhandle sections of Texas and Oklahoma into Kansas. The basin in its entirety includes approximately 70,000 square miles of surface area. This basin is presumed to have been occupied in Permian times by a vast sea, the source of the present salt beds which have an average thickness of approximately 1,000 feet and which underlie virtually the whole of this area. The existence of such a body of salt, which is presumed to have been laid down under conditions appropriate for the deposition of potash as well, occasioned the belief among geologists that potash might be found in this region and led eventually to the exploration work undertaken both by private capital and government expenditure. To date 44 core drilled wells have been sunk in this area in a search for mineable potash—17 by the Federal Government and 27 by private capital. These tests have been confined with the exception of two wells to the southern portion of the Permian Basin. The results of this work have been pictured in a general way in the preceding article of this series. Rich deposits of sylvinite have been discovered in Eddy County, New Mexico, and the United States Potash Company is proceeding with the sinking of a mining shaft preliminary to the commercial exploitation of its holdings. (See footnote at end of article). In addition, deposits of polyhalite said to be of commercial character have been discovered over wide areas. Private capital has under way a project for the development of polyhalite deposits in Midland County, Texas. It was suggested in the preceding article that if either or both of these ventures should prove commercial successes, additional private capital might be expected to flow into the industry.

That possibility makes appropriate a more detailed discussion of the economic characteristics of the potash industry. Because it is a mineral resource which may be found under widely varying conditions, influences primarily of a speculative character are apt to play an important role in bringing new capacity into existence. The German experience in this regard should be illuminating. The first potash mine was opened in the Stassfurt district in 1861. For twenty years exploration was confined to this area, but with a broadening of geological knowledge it became evident that potash might be found over the whole of the area of the so-called Zechstein Sea, an inland sea occupying during Permian times what is now north central Germany. By the opening of the War potash production had been extended over an area roughly 100 to 150 miles in extent in this region. Meanwhile additional producing regions had been opened up on the lower Rhine near Wesel and in Alsace where potash was discovered in 1904. From the single shaft in operation in 1861 the number had increased to 164 by 1913. During the decade of the Nineties and the first decade of this century developments in potash proceeded at a rapid rate, the industry having been subjected to a speculative exploitation comparable to that which American oil has experienced since 1900. The widely varied conditions under which German potash has been found, (both as regards its physical occurrence and its chemical characteristics) have been a contributing factor in bringing a ceaseless flow of capital into the industry[1]. In Germany deposits have

*Professor of Economics, University of Texas

[1]As pointed out in the first article of this series, price regulation by the Potash Syndicate has likewise contributed to this development.

been mined at depths varying from 600 to 4,000 feet (although the bulk of output comes from depths of approximately 2,000 feet). In some instances the deposits have had a thickness of but a few feet; in others, they have been well over a hundred. In some cases, the deposits have been so regular and so nearly flat that the entire layer can be mined by the extension of but a single horizontal drift; in other cases, they have been so highly undulated that such a single horizontal drift may cross the bed dozens of times within the distance of a thousand meters. At times the overlying layer is so unsubstantial that the excavated area must be backfilled at great expense; often the overlying layer is of such substantial character that it is adequately supported by a few unmined pillars of potash. Indeed, any or all combinations of these alternatives may be encountered. The chemical characteristics of the salts have shown a similar variability. The salts may occur as carnallite of such slight potash content as to make necessary such an expensive process of refining for adequate concentration as to place them entirely outside of the category of economic goods; or again, they may consist of the highly-prized sylvinite composed primarily of potassium chloride and sodium chloride with the former in some instances of such great concentration as to make possible the immediate utilization of the mixture in agriculture with little or no processing. And between these extremes there has been a limitless number of possibilities. Not only have these discrepancies manifested themselves as among different mines, but to a less marked degree within the same mine similar variations may and sometimes do occur. Such a wide distribution of potash under such highly varied conditions as have existed in Germany has tended to enhance the speculative character of potash mining. The hope of striking a richer supply of mineral or a supply of richer mineral, or a supply of mineral more accessible, which in competition with existing production might insure liberal profits if not enormous riches—in brief, the lure of hidden treasure, the pot of gold at the rainbow's end—of such elements has been compounded the speculation which has supplied the driving force in bringing new capacity into the German potash industry.

In this respect it should be observed that it is possible that potash might be found anywhere over the entire Permian Salt Basin area of the Southwest—an area many times as large as the total area within which production is now carried on in Germany. It should also be observed that this area has been inadequately tested, although deposits of extraordinary promise have been revealed. As previously stated, a total of only 44 core drilled wells have been sunk in a search for potash in the whole of this area, whereas in Alsace alone (where production is confined to an area of about seventy square miles) 165 core drilled wells were completed before active exploitation was begun. That the Texas-New Mexico region will be subjected to a more intensive search for potash should the exploitation now underway prove commercially successful, there seems little doubt. Moreover, as this region is subjected to a more intensive search for oil, its potash possibilities may be more definitely revealed. While the conditions under which potash is to be found in Texas and New Mexico seem likely to prove much more uniform as regards the physical deposition of the mineral than in the German case, deposits thus

The Southwest now offers potash in commercial quantities—Drilling in the Permian Basin

far brought to light indicate a striking variation over a small area both as regards thickness of deposits and their potash content. All in all, the physical circumstances under which potash is found and the speculative possibilities which the industry offers would seem to augur overdevelopment once the possibility of profitable operations has been definitely established. When account is taken of the fact that a single plant of the size of the largest of the German plants might have supplied the entire American consumption of 1929, the statement that the industry is apt to suffer from excess capacity seems unquestionable.

This conclusion leads to a consideration of a second characteristic of the industry: capacity once called into being tends to remain. According to economic theory as developed by the neo-classical economists, capacity in industry is presumed to adjust itself to the demands placed upon it. Overproduction resulting from an excess of plant capacity means lowered prices in a competitive effort to dispose of surplus product; high cost producers are thereby shifted from within to without the margin of profitable operations. Unprofitable operation is presumed to result in the withdrawal of capital which seeks new and more attractive fields of investment. Through withdrawal of capital capacity becomes once more adjusted to the economic requirements of the case. However true this may or may not be for industry at large, it seems not to be true in the case of a mineral resource industry.

Potash Mining Similar to Coal

Withdrawal of capital may presumably take place by either of three methods; by the turning of existing capital into other productive channels where its nature is sufficiently flexible; through bankruptcy and the disappearance of the bankrupt plant from the industry; and through the instrumentality of a sinking fund.

In the case of potash production any one or all of the avenues seem inadequate to insure a proper adjustment between demand and plant capacity. The production of potash is fundamentally a mining venture. Once workable deposits of potash have been discovered, their exploitation involves a mining process similar in its basic characteristics to that of coal. The opening of a potash mine involves an investment of a highly specialized and fixed sort. Once the investment has been made, capital cannot be readily withdrawn. The principal investment is represented by expended labor, the product of which remains in the form of a large and extended hole in the ground designed as a plant for the removal of the underlying potash. It can be used for no other industrial enterprise. Neither the mining shafts nor the underlying deposits can be turned to other account than that for which the investment was originally made. Neither does bankruptcy afford an adequate channel through which the industry may be rid of excess plant capacity. Bankruptcy may be followed by the writing off of capital losses; thus, through the instrumentality of bankruptcy a previously high-cost mine may become the effective competitor of what under the original investment condition was a mine of low cost. Bankruptcies tend primarily to eliminate differential advantages, the product of natural conditions or superior management. Bankruptcy may mean the disappearance of a particular business establishment; it is unlikely to mean the elimination of an industrial enterprise. The bankrupt mine with capital losses written off remains to plague the industry.

Nor is the situation fundamentally different with the refining branch of the industry, which is essentially a manufacturing enterprise. Once the salts have been brought to the surface, many of them are put through a process designed to increase the concentration of the potash content. Plant and equipment required for this processing are highly specialized in their nature and cannot be readily turned to other account. Since in practice the plants have been located at the points of recovery and since these, in response to the vagaries of nature, have been removed, for the most part, from centers of population, even the plant buildings and the surface area on which they stand have little use except that for which they were originally designed. Here bankruptcy is of little effect as a check on capacity.

Nor does the creation of a depreciation reserve and its direction toward more profitable fields rather than its application in the industry concerned afford a ready mechanism for capital withdrawal. Depreciation charges are customarily and appropriately considered as operating expenses. So long as operating expenses can be met, including interest on working capital and depreciation charges, these latter must be directed toward keeping the plant in a state of working efficiency. This would not be true were the equipment and other fixed capital used in the mining of potash like "the wonderful one-hoss shay that was built in such a wonderful way that it lived just one hundred years to the day"—and then collapsed. Since equipment wears out at irregular intervals, its replacement becomes properly a charge to operating expense. Failure to make necessary replacements may serve to junk the whole investment, since the economic life and industrial usefulness of a plant may be brought to an end long before all the individual items of capital which comprise it will have been worn out. Failure to make replacements as needed may thereby become disastrous. This avenue would seem to afford an inadequate mechanism for the transfer of capital.

In short, a mineral resource industry with widely scattered deposits, the exploitation of which requires a large fixed investment is apt to be plagued by a continuous excess of plant capacity. As evidence at

point, look to the American coal industry which is calculated to have had production capacity of from 31 per cent. to 117 per cent. in excess of the amount of coal produced in any year during the period 1890 to 1923. Despite this continuous excess of capacity, during this period capacity showed an increase from 153,000,000 tons in 1890 to 970,724,000 tons in 1923. While similar figures for the German potash industry are not available, it has been previously noted that in the rationalization program which has been carried through under government authority in the industry since the War, most of the mines have been permanently abandoned, production having been concentrated on the more efficient. In 1928 only 60 mines were in operation out of a total of 229 completed. These 60 mines turned out the largest volume of potash the industry has ever yielded.

Potash mining, in the absence of measures to prevent it, is apt to be an industry characterized by continuous over-capacity. It follows, therefore, that any particular time it is apt to be an industry of decreasing unit costs. That is, as the demands placed upon the industry increase and output expands (assuming no change in productive capacity) costs per unit of output tend to decline. The same tendency will be manifest in the case of either the industry at large or a single establishment. It follows further that potash production in the absence of collusion among the producers is apt to be characterized by a bitter competition among individual establishments to increase output and lower costs. Competition will result in a drive for business on the part of individual establishments, a drive for business which in the case of a standardized non-branded commodity such as potash will take the form of price competition. It was this situation in the early history of the German industry that resulted in the organization of the first potash cartel. (How the remedy, regulation of price and allocation of output with no control over capacity, served to aggravate the condition it was designed to alleviate has been related in the first article of this series.)

This leads to a consideration of still another aspect of potash, the fact that the demand for the product is relatively inelastic; that is, the amount of potash consumed will show but slight change with changes in the price of potash. Potash as a raw material of nature does not enter directly into use for the immediate satisfaction of human wants. As an indispensable plant food it finds its major use as a fertilizer on the farm. The two factors which would seem to be the major determinants of the amount of potash which will be used in any given year in any particular area are the farming habits of the community and the purchasing power in the hands of the farmers. Unacquainted with the importance of potash to the soil, a community of farmers might well refuse to use this plant food were it made available to them without money and without price. Accustomed to its use, they will be limited in the amounts consumed by their relative prosperity. Thus, during a period of falling commodity prices (but with slight increases in the price of potash) during the closing quarter of the Nineteenth Century, the amount of potash consumed in the world showed a tremendous increase primarily in response to an extensive and intensive program of education and propaganda conducted by the German Potash Syndicate. From 1900 to 1910, with potash prices almost stable, the consumption of potash fertilizer salts increased more than 200 per cent. Obviously, the price factor was inadequate to explain this development. Rather, it represented changes in the farming habits of the world's agriculturists, changes likewise effected largely through the program of propaganda conducted by the German Syndicate. Given the potash consuming habits of the farmers such as they may be at any particular time, the basic factor in determining the amount of potash consumed will be the purchasing power in the hands of the customary users of potash. Thus in 1924, with relatively depressed conditions in German agriculture, domestic consumption of potash fertilizers was only 446,200 tons of potassium oxide. With improved agricultural conditions in 1925 and with more favorable credit terms granted the farmers by the Potash Syndicate, the domestic consumption of potash showed an increase of 56 per cent despite an increase in the price of potash of 5 per cent. Depressed conditions in agriculture in 1926 were accompanied by a marked decline in the consumption of potash, while improved conditions in 1927 called forth a marked increase in domestic consumption despite an increase in potash prices of more than 14 per cent. This tendency for potash consumption to vary with the general prosperity of the farmer rather than with the price of potash is borne out by E. E. Vial's study of fertilizer consumption and cotton prices in the United States. Vial has found that the significant factor in determining the amount of fertilizer used in the production of cotton in any particular year is the value of cotton per acre in the previous year as calculated from cotton prices of December first of that year.

Fallacy of Price-Cutting

If this analysis is correct, a price-cutting campaign on the part of a hard pressed competitor anxious to lower costs by increasing the scale of his operations is apt to prove abortive. It may temporarily attract to a particular producer's door an enlarged volume of orders, but it is not likely to increase greatly the amount of potash consumed. Engaged in generally by an entire industry, it will not achieve its object of lowered costs, for a general lowering of prices by all producers is apt to leave the division of the market as

it was before such price competition was engendered. Such price cutting has but one outcome—demoralization for the industry at large.

If the foregoing analysis is sound, it indicates that capital will be wise if it proceeds slowly with any increase in capacity, however profitable the initial venture may prove to be. That the sylvinite deposits already discovered and now under development are likely to permit of profitable operation to the company which has them in charge, the writer has little doubt. If perchance this pioneer should long hold the field alone, continuing profitable operations may be anticipated. Should the outcome of this pioneer venture engender a successful search for additional deposits of sylvinite, (and there is no good reason to believe that additional deposits will not ultimately be revealed; in truth, a previously stated lost section of the cores in each of the wells drilled by private capital in Midland County indicates the existence of a water-soluble salt, perhaps sylvinite) or if the processes of refining polyhalite as worked out by the Bureau of Mines should in practice permit of the profitable exploitation of the widespread polyhalite deposits (the process worked out by Dr. E. P. Schoch of the University of Texas will presumably be protected by patents) it seems not unlikely that an American potash industry might duplicate the experience of the German industry with its expensive over-development before its recent rationalization under State control, or that of our own American coal industry.

But whether or not, it would seem that the American consumer of potash bids fair to be freed from purchases in a German-French controlled, quasi-monopolistic market.

Since the above was written, the shaft has been completed and the United States Potash Co. is now placing its products on the market.

Research at Mellon Institute During 1930-31

In his eighteenth annual report to the board of trustees of Mellon Institute, Director E. R. Weidlein has summarized the activities of the institution during the fiscal year ended February 28, 1931. The sum of $805,204 was contributed to the Institute by the industrial fellowship donors in support of scientific research. The total amount of money appropriated by companies and associations to the Institute for the twenty years ended February 28, 1931, was $7,554,477.

E. R. Weidlein

Throughout the entire fiscal year 76 industrial fellowships—22 multiple fellowships and 54 individual fellowships—were in operation. During the preceding year the number of fellowships was 71. In 1930-31, 140 industrial fellows and 49 assistants held positions on the research staff. Sixty-four industrial fellowships (17 multiple fellowships and 47 individual fellowships, three more than on February 28, 1930) were active at the close of the fiscal year. Nine fellowships are being sustained by industrial associations. The industrial research personnel consists of 109 fellows and 31 assistants. Thirty-one fellowships have been in operation for five years or more, and of this number 18 have concluded more than ten years of work. Three and possibly four new fellowships will begin operation during the early part of the present fiscal year—just as soon as laboratory space is available.

According to the report, particularly noteworthy results have come from the following fellowships: air pollution, by-product coke, face brick, fertilizer, heat-insulation, iodine, nitrogenous resins, organic synthesis, refractories, sleep, and utensil. Twelve fellowships completed their research programs, namely: chrome ore, insulating lumber, portland cement, composite glass, yeast, inhibitor, steel treatment, rock products, roofing, fatty acids (uses), oxygen, and face brick. Thirteen new fellowships were added to the Institute's roll during the fiscal year, as follows: safety fuse, plastic composition, bread, cottonseed products, hydro-engineering, abrasives, newsprint, sugar, fatty acids (synthesis), shoes, optical glass, commodity standards, and tire bead.

The Department of Research in Pure Chemistry had a productive year and two fellows were added to the staff. Twenty-two investigational reports have been published since the establishment of this department in 1924. Among the subjects that are receiving research attention are the chemistry of marine plants, cherry gum, gum arabic, and quince-seed mucilage, and the properties of the sugar acids.

The publications by members of the Institute during the calendar year 1930 included 1 book, 5 bulletins, 45 research reports, and 44 other papers. 16 U. S. patents and 13 foreign patents were issued to fellowship incumbents. The total contributions to the literature for the 19 years ended January 1, 1931, have been as follows: 16 books, 101 bulletins, 573 research reports, 893 other articles, and 423 U. S. patents. These publications are listed in the Institute's Bibliographic Bulletin No. 2 and its four supplements.

The commencement of the construction of the Institute's new home is referred to as the most important event during the year covered by the report. Early in May, 1930, it was decided that, as the present two buildings of the institution are inadequate for the immediate and future needs of its departments and industrial fellowships, a commodious modern structure would be built at the corner of Fifth and Bellefield Avenues, Pittsburgh.

A. C. S. Meeting at Indianapolis

Aside from the presentation of technical papers the most important feature of the American Chemical Society Meeting at Indianapolis last month was the report of the committee on industrial alcohol regulations. These were assailed in no uncertain terms.

The committee report, says in part: "The new alcohol legislation was enacted by Congress in a summary manner, which waved all opposition aside after giving it little or no consideration. The industrial advisory council to the Commissioner of Industrial Alcohol is at present the best means of contact between the industries and those who are undertaking to enforce the law."

The report points out that although "the Bureau of Industrial Alcohol is in the Treasury Department, the administration of industrial alcohol lies jointly under the Attorney-General and the Secretary of the Treasury."

The law is such that it is probable, in cases of differences of opinion between the two departments, "the opinion least favorable to industry will prevail," the report continues, pointing out that changes in the law have made it necessary to draw up new regulations which are expected to become effective soon.

Intermediates and Solvents

Two Chemical "War Babies" That Have Grown Up

By Williams Haynes

While it is almost impossible to over-state the importance of the world-wide nitrogen activities previously described*, they were not the sole chemical development that grew out of new explosives perfected during the World War. New types, both of propellants and disruptives, were found that demanded new raw materials and required new apparatus.

Black powder, discovered centuries ago by the Chinese, passed from military history with our Spanish War. The British army in the Boer War and both combatants in the Russo-Japanese War, fought with smokeless powders of the nitrocellulose type discovered by Noble. Essentially these propellant explosives are the gelatinization of nitrocellulose in nitroglycerin. The extreme hazards of manufacturing were minimized by replacing the old heating method with a cold gelatinization using acetone as a solvent. The British cordite of the Boer War, contained 58 per cent nitroglycerine and 37 per cent nitrocellulose with 5 per cent petroleum jelly as a stabilizer. This formula had been replaced by 1914 by one-third nitroglycerin and two-thirds nitrocellulose. The greater amounts of nitrocellulose demanded correspondingly greater quantities of acetone, and though much of the solvent was recovered, British acetone requirements for cordite manufacture were as we shall see, an important item in the war-time solvent situation.

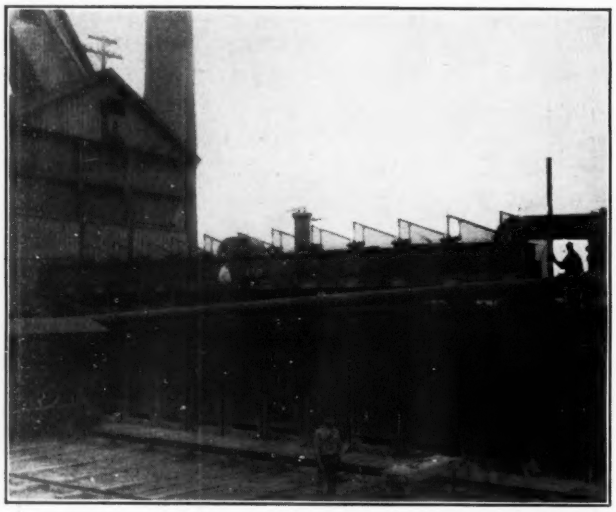
While the formulas and processes varied somewhat in the different Allied countries, the propellants used throughout the World War were of this general type; but among the disruptants appeared several new products. The modern high explosive had placed a special emphasis upon artillery, and an important military lesson learned in South Africa and Manchuria was that the effectiveness of this arm of the service might be further increased by exploding shells. For this purpose a powerful explosive, stable enough to withstand the shock of discharge and so available as a disrupant, was needed.

*In "Mars, The Chemical Industrialist," page 148, February issue.

After they made up their minds that the Boer War was not to be "a Christmas party in Petroria," the British began using lyddite as a shell charge. About the same time the news leaked out of France that the military authorities there were experimenting with a wonderful new disruptant called melinite. Shortly afterwards it was learned that the base of both lyddite and melinite was picric acid, or tri-nitro phenol. German work along these lines was carefully guarded and even now we do not know when they first discovered tri-nitro toluol—the T. N. T. of the World War—as an improved disruptant, nor when they perfected the mixture of tri-nitro toluol and ammonium nitrate which charged their high explosive shells during the early stages of the war. These disruptants emphasize once again the war importance of nitrogen. Their chief peacetime interest to the chemical industry, however, lies in the fact that they are coal-tar derivatives and their use in modern warfare turns the coal-tar dye industry into a potential munitions depot.

With a complete, well organized dye industry, perfectly equipped and manned with men familiar with coal-tar technology, Germany, obviously held a valuable advantage. This handicap the Allies manfully set out to overcome. So vividly did this necessity impress itself upon all people that solution of these coal-tar problems stand in popular imagination today as the most important and distinguished chemical achievement of the period. Prior to the war the British coal-tar industry had rather specialized in disinfectants and doubtless with an eye to the war possibilities of picric acid had dominated the market situation in phenol. But the supply of phenol from coal-tar very soon proved to be woefully inadequate, and synthetic production, starting from another coal-tar distillate, benzol, became an imperative war necessity. At the same time, in order to ease the requirements for picric acid (tri-nitro phenol) another coal-tar distillate, toluol, was employed in the production of T. N. T. France could help but little, for she lacked coal; and every British

resource strained to the uttermost was still inadequate. Demands were made upon America. At that time 72 per cent of our coke was produced in the beehive type oven that yields no by-products, but the rapidly advancing prices of benzol and toluol prompted our steel and gas industries to install



The first By-Product coke oven to be constructed in the United States

recovery ovens and our output of these materials mounted rapidly.

	Benzol per month	*Toluol per month*
End of 1915	1,750,000 gals.	525,000 gals.
End of 1916	2,500,000 "	700,000 "
End of 1917	3,000,000 "	857,000 "
End of 1918	5,000,000 "	1,400,000 "

This feverish expansion has been widely described by David W. Jayne, who as the manager of the Chemical Department of the Barrett Company, was in the thick of this work:

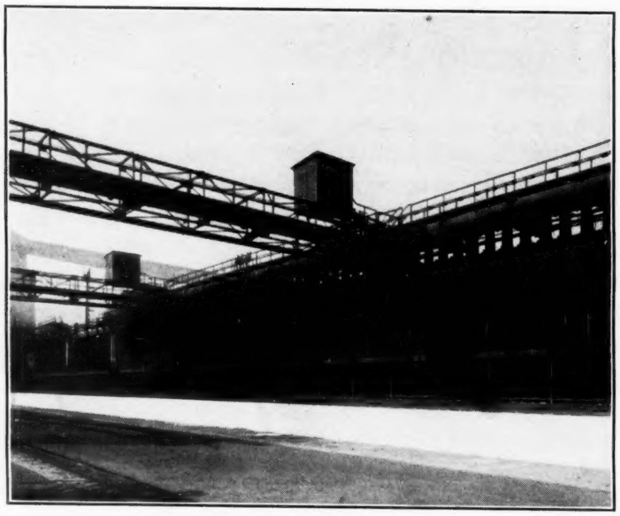
"In the case of phenol the country encountered its first chemical problem. Scarcely anyone had a practical knowledge of the design or proper operation of a synthetic phenol plant. It had been made before in a small way by both the Semet-Solvay Company and ourselves, but it was a question of tons where pounds had been considered before. A number of assemblies of pots, pans and tanks resulted, in which a certain amount of phenol was made, but with an awful waste of materials due to poor yields. The American chemist, however, lived up to expectations and there gradually evolved from these first crude attempts better and better yields; as . . . The same situation applied to the manufacture of picric acid and T. N. T. Certain known methods were taken and applied. Again the same situation held with the beginning of the manufacture of intermediates, dyes and the simpler pharmaceuticals. The manufacture of the intermediates was very similar to the situation in the manufacture of the explosives; but the manufacture of dyes was probably less difficult because explosives must pass strict inspection tests, and the standard quality of the simpler intermediates was fairly well extablished; but anything that would color a fabric at all was considered as a dye.

The efforts in 1915 and 1916 were all toward production—never mind the economies, the fine points, or the short cuts.

Our own entry into the war only intensified these demands and government aid accelerated the production. But with the signing of the armistice all this insatiable demand for coal-tar crudes died. The War Department found itself not only with vast stocks on hand, but also with all sorts of commitments to assist financially in plant extensions and to take in specified quantities at agreed prices. These contracts were in the main ruthlessly cancelled, and although certain compensations were later arranged, the situation of producers was critical.

The benzol producers, for example, had increased their output threefold. In desperation they turned to the blenders of motor fuel for an outlet. They were so successful in developing this market that during the decade following the war, while from ten to twelve million gallons of benzol continued to be consumed annually in chemical manufacturing, in rubber cements, and as a solvent for artificial leather, plastics, lacquers, etc., nevertheless the motor benzol consumption grew at the same time to a hundred million gallons yearly.

Phenol producers faced a different situation but their readjustment to post-war economic conditions exhibits certain similarities to the new markets developed for benzol. Prior to the war the chief uses of phenol had been the manufacture of salicylic acid (for salicylates and aspirin) and of the various phen-

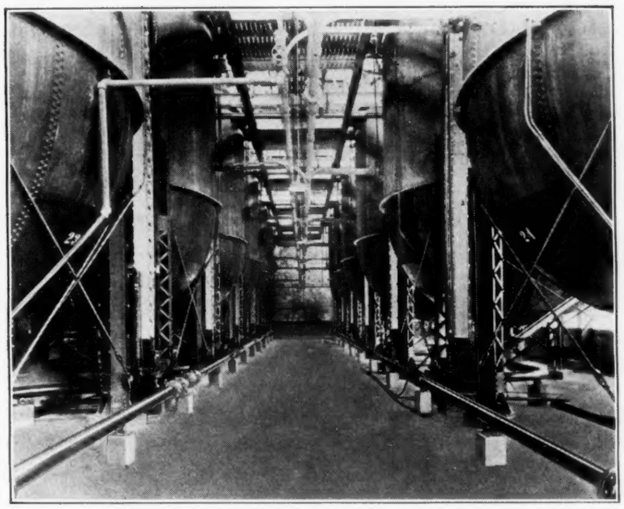


Comparison with the above photograph shows how the industry has developed since the War.

olic resins. The country's consumption was estimated to be about six million pounds pretty evenly divided between these two major uses. At the end of the war the United States Government held a surplus stock of over four million pounds of phenol, or about six years' normal supply. In September, 1919, this was wisely turned over to the Monsanto Chemical Works, one of the principal producers, to market. It was agreed that this Government ma-

terial was not to be exported, the foreign demand being reserved as an outlet for current production. The open market price was set at 12c a pound, and phenol appeared to have moved into a stalemate that promised to last for five or six years. Within three years the war-surplus stocks had vanished from the market. Radio had become a popular plaything, and almost overnight a great and unexpected demand was created for synthetic resins. The Government stocks of phenol were quickly cleaned out, and the Bakelite Company, the largest manufacturer of phenol condensation products, in order to protect its raw material costs saw fit to build a phenol plant of its own at Painesville, Ohio. They installed the improved Tyrer process and by early 1925 had reached an output of over a million and a quarter pounds monthly. Just at this time the new Dow phenol process came into production, and the Bakelite Company, while holding its own plant in reserve, entered into a contract to buy their requirements at a price substantially the same as their own making cost. So rapid was the expansion of the market, due at once to wider demand and lower prices, that our phenol consumption virtually doubled within the first five years after the war.

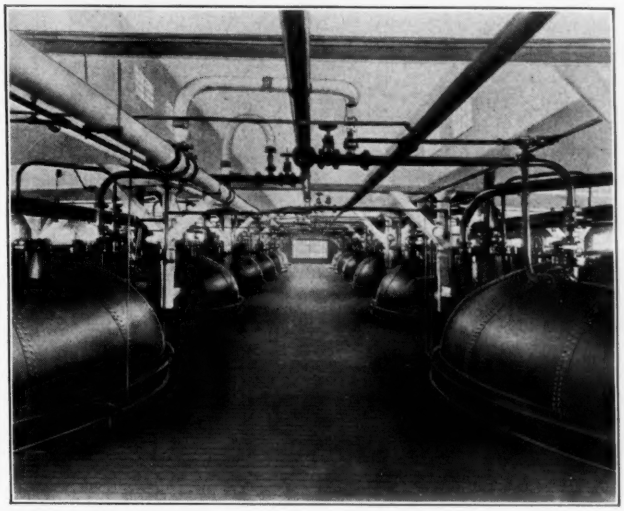
The vast munitions requirements for both nitric acid and phenol were met during the war, as we have seen, by the extension of production facilities already in existence. In the case of the third of the three chemicals which we have chosen to illustrate the war's effects upon the chemical industry, this was



Fermentation tanks at the plant of the Commercial Solvents Corporation at Peoria

not the case. Acetone demands could be met only by an entirely new source of supply.

In the destructive distillation of hard-wood, acetone is obtained in two ways; by rectification of the crude methanol and by the dry distillation of acetate of lime. Employing both processes it is possible to obtain about fifty pounds of pure acetone from a cord of wood. In 1914 there was in the United States (the world's chief source of wood distillation products) a plant capacity for handling 900,000 cords of wood annually, or a potential supply of forty-five million pounds of acetone. The actual production for that year, however, was only 10,425,817 pounds. A wood distillation plant with acetone recovery equipment cost at the time about $3,000.00 per cord capacity, a hopeless overhead charge even if judged by war-



Fermentation tanks, capacity of each fermentator 50,000 gallons

time standards of cost and necessity. Furthermore, it would be virtually a helpless investment. Efficiency demands seasoned wood for the distillation process so that kiln drying, necessary to equalize the time element of natural seasoning, would require additional plant, fuel, and labor while the lumbering operations involved would require a man power quite impractical in the face of the labor shortage.

Nevertheless, acetone was essential in the manufacture of the British explosive cordite. How pressing was that demand may be guessed when we remember that at their maximum output British munition factories turned out over 4,000,000 pounds of cordite weekly. Furthermore, two other necessitous demands arose. The new nitrocellulose lacquer used to coat airplane wings, popularly known as "airplane dope," required acetone as a solvent, and the tear gases remarkably effective before the use of the gas mask with goggles became common, were bromine-acetone compounds.

Plainly the supplies of acetone from calcium acetate derived in wood distillation were going to be inadequate, and quite as plainly no relief could be found in expanding the wood chemical operations. Two other chemical methods were available and both used. Ethyl alcohol oxidizes to acetic acid: the process of making vinegar. Calcium carbide treated with water involves acetylene, which may be converted to acetaldehyde and by oxidation to acetic acid. The acetic acid from either source can be converted to calcium acetate, from which acetone is produced as in the original wood distillation process.

The so-called vinegar process was put into operation at Curtis Bay, Md., using alcohol from the nearby distillery of the United States Industrial Alcohol Company, and an output of thirty tons of acetone daily reached. On the Pacific Coast the Hercules Powder Company, using kelp, obtained acetic acid which they converted to acetone. In India and the East Indies, Great Britain utilized colonial supplies of molasses by fermenting them to alcohol and carrying on the acetic oxidation over bamboo sticks. All these "vinegar plants" shut down in 1918.

At Niagara and Shawinigan Falls the calcium carbide output was increased by the British and acetone produced by the acetaldehyde process; but these operations too, closed down after the war. In 1927 this process was again operated, but in order to obtain pure acetic acid which at that time began to be in large demand for rayon manufacture.

Both the vinegar and the carbide processes proved to be inadequate during the war and uneconomic afterwards. It was an entirely new process that solved the acetone problem during the crisis and which proved to be a potent factor in the post-war chemical developments.

Butyl Alcohol By Fermentation

Just before the war, the English firm of Strange and Graham undertook to produce butyl alcohol by the fermentation of potato starch, using a bacteria which had been isolated by Fernbach. Their objective was the synthesis of rubber along the lines laid down by the research of Perkin, starting with isoprene, a derivative of butyl alcohol and acetone. Their operations were hardly beyond the experimental plant stage when the war demand for acetone arose; but they had gone far enough to know that the Fernbach fermentation yielded 30 per cent butanol, 15 per cent acetone, and 5 per cent ethyl alcohol. Accordingly, they forsook their rubber work and turned to the production of acetone. In the meanwhile Charles Weizman had isolated another bacteria that fermented grain, in place of the potatoes required by Fernbach's strain; and this more available material was chosen by the Noble interest when in 1915 they built an acetone fermentation plant adjacent to their explosives factory. So successful was this process that several large British distilleries were adapted for its operation, and when submarine activity make it essential to conserve British foodstuffs supplies, the Weizman process was transplanted to converted whisky distilleries at Toronto and Terre Haute. After we entered the war our Government took over a similar plant at Peoria and converted it for acetone fermentation.

In all of these war-time operations, it was the acetone that was sought in this fermentation, and the greater quantities of butanol necessarily produced were regarded as a bothersome waste, although considerable quantities were broken down into methyethyl keytone which, like acetone, could be used as a solvent for nitrocellulose. It was this butanol, however, not the acetone, which enabled us to salvage this war-born fermentation process for peaceful uses that have given us a new industry.

Lacquer and Solvents

Even before the war, lacquers had been the dream of many chemists who saw quite clearly the advantages of a plastic dissolved in a solvent. But lacquer remained only a dream, because at that time there was but one suitable plastic and only a single suitable solvent. The plastic was celluloid (nitrocellulose made plastic by the use of camphor) and the solvent was fusel oil (amyl alcohol) and its derivatives. Lacquer development was checked short by the highly fluctuating price of camphor, a natural product monopolized by the Japanese, and by the strictly limited supply of fusel oil, a by-product of alcohol fermentation.

In seeking a use for the accumulated war stocks it was discovered that butanol and its derivatives enjoyed the valuable solvent properties of fusel oil. In sharp distinction to these amyl compounds, the butyl solvents could be produced in unlimited quantities and the greater the output became, the lower the costs of production would fall. The camphor problem was solved by the gradual perfection of a host of new chemical plasticizers such as triphenyl and tri-cresyl phosphates, which were known before the war, the ethyl and butyl phthalates, butyl stearates, and a range of similar products. Since there was also on hand a great accumulation of nitrocellulose available at salvage prices, the rapid expansion of the lacquer industry following the war was all but inevitable. The organizers of the Commercial Solvents Company, which secured the Weizmann patents and bought the Government plants at Terre Haute and Peoria, were astute enough to seek their immediate future in the lacquer field, and during the early years of their operation butanol was their chief product and acetone was for a time almost a waste.

It has been cleverly said that acetone is the typical chemical of modern civilization. Certainly no chemical owes more to modern chemical technology. When acetone was first produced commercially (the Albany Chemical Company in 1888 was the pioneer American manufacturer) a brilliant future was forecast for it. But the only really important commercial use discovered prior to the war was as a solvent in which acetylene might be shipped safely. This use is still important (over two and a half million pounds in 1930) but the war-use as a solvent for airplane dope created a new opportunity for acetone. For it introduced the whole modern solvents development, centering about acetone and the cellulose acetate fibres. Tear gas, airplane, lacquer, rayon, acetylene torch—these are the distinctly modern products that have made

secure the place which acetone made for itself during the war in our chemical economics.

Directly out of the exigencies of the world war sprang such notable chemical progress as could hardly have been accomplished in half a century of normal industrial and technical advance. Ammonia systhesis broke Chile's grip upon the nitrate markets of the world, the most powerful and most lucrative of the natural monopolies, and freed mankind forever of the fear of starvation because of failing stocks of plant-food nitrogen. It wrought a chemical revolution in the fertilizer industry and introduced the modern concentrated plant-foods destined surely for an important place in the future of agricultural production. The war needs for phenol gave the United States a coal-tar chemical industry with its thousands of brilliant dyes, its subtle perfumes, its photographic agents, its invaluable modern medicines. It has brought us the blended "no-knock" motor fuel and by lowering the cost has widened the use of such practical chemical substitutes as synthetic resins and artificial leather. From the butanol-acetone fermentation process has come directly the lacquer that finishes our automobiles in a wider range of colors, more beautiful than ever before, and almost as durable as the metal it coast so quickly and economically.

And these direct results of war-time chemical accomplishments have all come from out three lines. There are a score of other important developments, but miraculous as these direct results are, the indirect influences of the war upon our chemical industry have a deeper meaning.

For the war demonstrated to all the world that the chemical industry is the master key to the materialistic side of our modern civilization. In peace or war, for every act and every industry, chemicals are the universal necessity. Lawmakers have come to understand the vital importance of chemicals to national security, national prosperity, and national health. The attention of dominant financial interests has been riveted upon the chemical industry's broadening opportunities. Most important of all, however, was the quickening of the industry itself. Chemists rediscovered those pragmatic ideals of chemists' service to man which had inspired the early days the science. Industrialists caught a new vision of the economic place of chemicals in a world clamoring for more and better and cheaper materials. The sensational chemical developments of the post-war period, which I have often characterized as the chemical revolution of industry with its bold juggling of materials, its startling applications of processes, its eager reaching out into new fields, all trace back to the stimulation of the war.

Foreign

The strength of the British chemical industry, built up in recent years, enabled it to come through 1930 in a better position than the majority of British industries, according to a survey made by Trade Commissioner Roger R. Townsend. Since the industrial disturbance in 1926, he points out, the chemical industry of the United Kingdom had made consistent progress up to the end of 1929.

The index of production for chemical and allied trades during the first three-quarters of 1930, the survey shows, revealed a marked decline from the averages of the two preceding years. It was also substantially below the general index for all manufacturing industries in the 1930 period, whereas in the two preceding years the chemical index had been slightly above the general index.

Unemployment in the chemical industry increased in 1930 at a more rapid rate than in British industry as a whole. Notwithstanding this development, the percentage of unemployed in this industry, although it had doubled during the year, was still not as high as that for the entire country.

Referring to foreign trade, Trade Commissioner Townsend's report shows that the United Kingdom maintained its favorable chemical trade balance last year, with an excess of exports amounting to more than $11,000,000. Imports of chemicals into the country in 1930 had a value of $114,000,000, while the figure for exports was $125,000,000. One phase of the British foreign trade in chemicals of outstanding interest was the marked decline in re-exports which last year amounted to less than $9,000,000, a figure lower than the prewar volume. The lessened foreign demand for British chemical products was most pronounced in some of the best foreign markets. Shipments to the United States and the overseas empire countries were restricted in 1930, while the continuance of disturbed conditions in the Far East, especially in India, also had an adverse effect.

Concluding his study, Trade Commissioner Townsend declares that the year 1930 was one of consolidation rather than expansion. The imperial Chemical Industries, the largest single unit of the British industry, led the movement in concentration by removing several of its plants to Billingham.

Baldwin New A. C. S. Treasurer

At the recent A. C. S. meeting Robert T. Baldwin was unanimously elected Treasurer of the American Chemical Society to fill the unexpired term of the late Dr. John E. Teeple. Dr. Baldwin comes well qualified, having served faithfully as executive secretary of the Association of Consulting Chemists and Chemical Engineers, Inc., secretary-treasurer of the Bureau of Employment of The Chemists' Club, Inc., secretary of The Chemists' Club, secretary of the Chemists' Building Co., secretary and treasurer of the Chlorine Institute, Inc., secretary and assistant treasurer of the Milk Sugar Institute, Inc., secretary of the Sodium Phosphate Institute, and executive officer of the Solvents Institute, Inc.

Robert T. Baldwin

He is a member of the American Chemical Society, the American Water Works Association, The Chemists' Club, the Cosmos Club, the Masonic Order, the Technical Association of Pulp and Paper Industry, the Textile Institute (British), and a member of the executive committee of the New York Section of the Society of Chemical Industry.

He was formerly general superintendent of Joseph Bancroft & Sons Co., of Wilmington, Del. During the war he served as a civilian in the Quartermaster Corps and Staff of the U. S. Army, and following this he was associated for a time with the National Aniline & Chemical Co. He is a Consulting Editor of Chemical Markets.

What are the Future Trends
In the American Synthetic Yarn Industry?

(Part II)

By Dr. Charles E. Mullin*

The rapid growth and almost unprecedented development of the synthetic yarns industry in the United States during the last twenty years has served to interest many persons not directly connected with this industry in this new and very successful product and the processes for its manufacture. Most people realize that not all of these yarns, and the fabrics made from them, are the same. In the present paper Professor Mullin briefly and simply outlines the methods used in manufacturing the four types of these yarns now made in America and other parts of the world.

THERE are now four more or less different types of synthetic yarns manufactured and used in America. Although they all resemble true silk in general appearance and were originally developed as "artificial silks," they long ago developed a field of usefulness and value all their own, quite aside from their use as a substitute for natural silk. The American public has long regarded with suspicion and doubt all "artificial" products, so that with the development of this new type of yarn or fiber, and its many new uses, the name artificial silk was gradually abandoned. These yarns were, for awhile, known collectively as rayons, but this name has gradually come to mean particularly the type of synthetic yarn manufactured by the viscose process, and the newer term "synthetic yarns" is used collectively for all of the man-made yarns.

Chemically speaking, the term artificial silk was always a misnomer for the reason that none of them bear even a remote chemical relation to natural silk. Natural silk is composed of protein material, fibroin, whereas all of the so-called artificial silks are of cellulosic origin, carbohydrates, and belong to the same large chemical group as sugar, starch, etc. All of the synthetic or man-made yarns are manufactured from either cotton linters or wood pulp, purified cellulose, and maintain this cellulosic structure in the finished yarns. The nearest approach of the synthetic yarns to natural silk is in their physical and textile properties, and appearance. In appearance the better qualities of the synthetic yarn fabrics so closely resemble natural silk fabrics that it is impossible for a textile expert to distinguish between them without a special test. In this connection it is interesting to note that the bulk of the present American production of both synthetic yarns, and fabrics made from them, are far superior to the bulk of the foreign synthetic yarns and fabrics.

Four Types of Yarns

As just mentioned, there are four different types of synthetic yarns, which are made by somewhat similar, and yet quite different chemical processes. In fact the final results of each process, the four types of synthetic yarns, resemble each other in appearance far more closely than one would expect from the quite different details of the methods used in their production. The four methods of manufacture, which are practically the same in America as in all other parts of the world, are as follows: The *cellulose nitrate* process, used in producing Tubize yarn. The *cuprammonium* process, giving Bemberg yarn. The *viscose* process, used for viscose yarn or rayon. The *cellulose acetate* process, giving Celanese brand yarn.

The same raw material, cellulose, is used in all of the four processes of manufacture and, theoretically at least, almost any source of cellulose can be used for this purpose. In practice it has been proved that the cellulose from all sources is not equally suitable for the manufacture of synthetic yarns and in America only purified cellulose from cotton linters and wood pulp is used. Many other sources of cellulose have been proposed and investigated but have never been adapted in commercial yarn manufacture.

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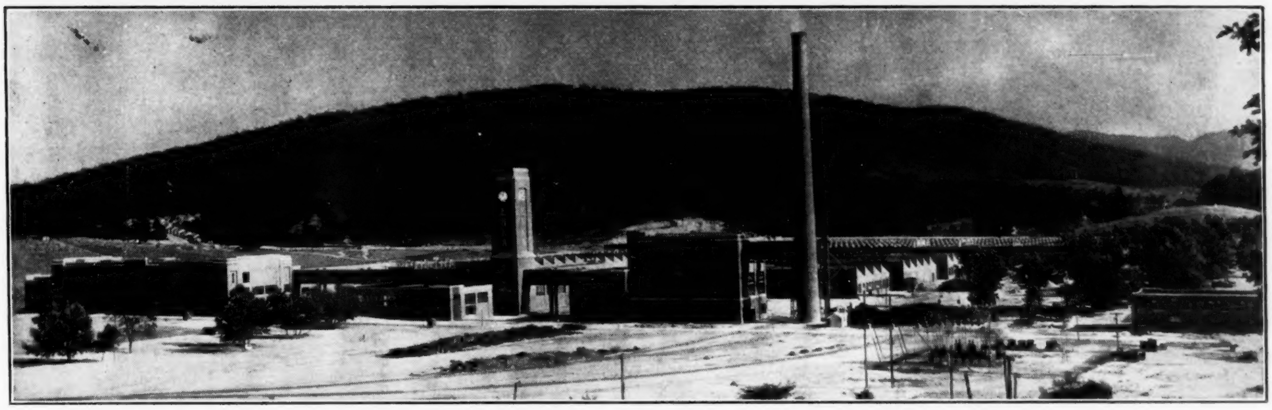


Plant of the American Enka Co., Enka, near Asheville, N. C., and below, American Bemberg Corp., Elizabethton, Tenn.

In each process of manufacture the natural cellulose (cotton linters) is well purified by boiling with sodium hydroxide solution under pressure in closed kiers followed by bleaching with sodium hypochlorite solution. During the latter process it is also beaten in a hollander, much as in the manufacture of paper. The purified cellulose is then treated by a special process so as to bring it into solution or to render it soluble in certain solvents. The various methods by which the cellulose is brought into solution form the major differences in the various processes of synthetic yarn manufacture.

Cellulose Basic Chemical

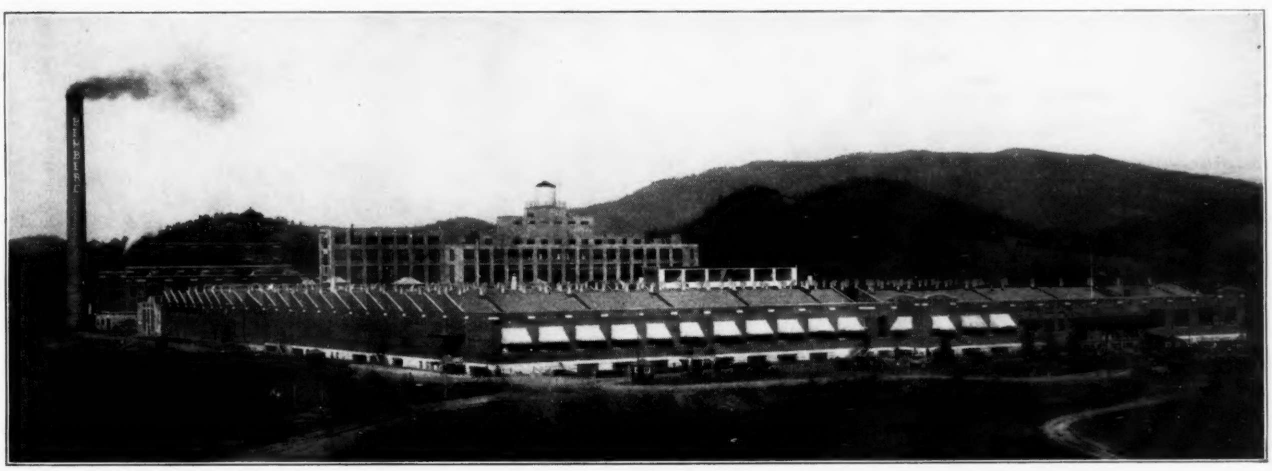
In each different process of manufacture, this cellulose solution is spun to give the actual filaments, which, when collected and twisted together, form the thread or yarn. In each of the spinning processes the cellulose solution is forced through fine holes, usually in a small metal plate called a spinneret, into a liquid or air which neutralizes or removes the solvent and coagulates or precipitates the cellulose filaments. In most processes the spinnerets have many fine holes, the exact number of which varies with the number of filaments desired in the yarn, and the filaments from each spinneret are collected and twisted together to form a single thread. In the pot spinning process, so widely used in the manufacture of rayon by the viscose process, this twisting proceeds simultaneously with the collection of the filaments. In the bobbin spinning process the filaments are twisted by a separate and special process after spinning.

It should be understood, of course, that the above is merely a very brief outline of the general process by which all of these yarns are manufactured. The exact details of each process vary widely from those of the other processes. Roughly, these steps may be summarized as follows:

1. Purification and bleaching of the crude cellulose.
2. Solution of the cellulose by various chemical processes.
3. Ageing or ripening of the cellulose solution. (Viscose process only.)
4. Filtration and deaeration.
5. Actual spinning of the cellulose solution.
6. Twisting together of the individual filaments to form the yarn.
7. Removal of impurities or other undesirable chemicals from the yarn. (In all processes except the acetate process.)
8. Bleaching, washing, oiling, drying, inspecting, and winding the yarn.

The Cellulose Nitrate Process

In the cellulose nitrate process of synthetic yarn manufacture, the caustic-boiled and bleached cotton



linters are nitrated with a mixture of nitric and sulfuric acids to give cellulose nitrate. This is washed in tubs and in the beater, and then boiled to stabilize it by the removal of sulfates, etc. After centrifuging to remove the excess of moisture, the cellulose nitrate

Inspecting the fine filament yarns in the plant of the American Bemberg Corp., at Elizabethton, Tenn.

is dissolved in a mixture of ether and alcohol to form the *collodion* spinning solution. This is filtered, deaerated, and forced through fine capillary glass tubes, located in special closed spinning chambers, into air which evaporates the solvent, leaving filaments of cellulose nitrate.

A number of these individual filaments are collected on a bobbin and twisted together to form the thread. These threads are wound into skeins, which are treated with a sodium hydrosulfide solution to remove the nitrate groups, leaving a regenerated cellulose yarn. The denitrated yarn is washed, bleached with sodium hydrochlorite, scoured with acid, washed again, neutralized with alkali, soaped or oiled, dried, and inspected. It is then ready for shipment in skein form, or for rewinding into any desired form of package. Nitro silk is manufactured in America only by the Tubize Chatillon Corporation at Hopewell, Virginia.

Viscose Rayon

In the viscose process of rayon manufacture, the purified linters or wood pulp, in the form of sheets about 18 inches square, are saturated with strong caustic soda solution in a suitable tank with arrangements for pressing out the excess of alkali solution. These sheets, containing a definite amount of alkaline solution, pass into a shredder where they are disintegrated into soda-cellulose crumbs. The crumbs are placed in sheet-iron, covered cans and *aged* for a definite length of time under carefully controlled temperature and humidity conditions. After ageing, they go to the xanthators or churns, where they react with carbon disulfide to form the desired sodium cellulose xanthate. This xanthate is soluble in alkaline solution to give the viscose spinning solution. The viscose solution is *ripened* by storage for a definite length of time with close temperature control, filtered, and deaerated, when it is ready for spinning.

The spinning is effected by forcing this viscose solution through another filter, a spinning pump or meter, and the spinneret, which is immersed in an acid precipitating bath. Spinnerets of small diameter and containing as many fine holes as the number of filaments desired in the yarn are used. The acid bath neutralizes the alkali in the viscose solution and regenerates the cellulose in the form of fine filaments. The filaments from each spinneret are collected on a separate *bobbin* or in a rapidly rotating spinning pot. Where the filaments are collected on a bobbin they are wound parallel, without twisting; but in the pot spinning process they receive a twist of about 2.5 turns per inch, due to the rotation of the pot.

After washing and neutralizing the acid present in the yarn, the bobbin-spun filaments are rewound onto spools for twisting on a special machine. The twisted yarn, from either the bobbin or pot spinning process, is then desulfurized, usually by means of a sodium sulfide solution, bleached, washed, oiled, dried, graded, and rewound into packages or packed for shipment.

The Cuprammonium Process

Cupra silk is manufactured by a process somewhat different from all of the others, in that the damp, purified, linter-cellulose is dissolved directly in a solution of copper hydroxide in strong ammonia, without any previous chemical treatment. This specially pre-

Viscose dissolvers in a plant of the Industrial Rayon Corp.

pared cellulose solution is filtered and deaerated, and is ready for spinning at once without either ageing or ripening.

Just as in the previous processes, this cellulose solution is forced through a spinneret into a suitable coagulating bath. However, in this case the spinneret

is larger in diameter, has rather large openings, and the coagulating solution does not completely harden the filaments. The result is that the incompletely coagulated filaments may then be stretched by a special arrangement of the spinning apparatus so as to give individual filaments finer than those obtainable by any other process of synthetic yarn manufacture in commercial use today. The stretched filaments are finally hardened in a second precipitating bath, and are collected on reels in the form of skeins.

This yarn contains considerable precipitated copper, which is dissolved out of the skeins immediately by means of a dilute sulfuric acid solution. It is then washed, neutralized with dilute alkali, bleached, washed again, soaped or oiled, dried, and sorted. It is finally wound onto spools, twisted, and then rewound onto cones or other packages for use. Most of the cupra yarn is now used for knitting, etc., and very little first grade yarn is shipped in skein form. Cupra yarn is manufactured in America by the American Bemberg Corporation at Elizabethton, Tennessee. This company is now producing on a commercial scale yarns as fine as 15 deniers with 25 filaments. The filaments in this yarn are about 2.5 times finer than those of natural silk, being only about 0.004 of an inch in diameter. It requires about 4,225 miles of one of these filaments to weigh a pound. This is by far the finest filament yarn ever produced commercially.

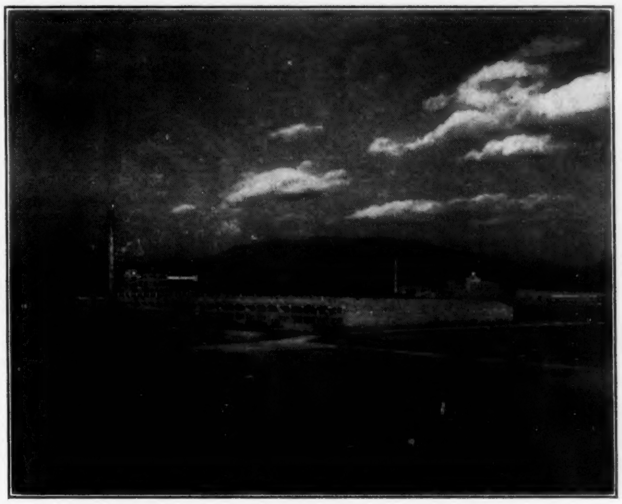
The Cellulose Acetate Process

The acetate silk is manufactured by a process which resembles that used for the production of nitro silk, in that the purified cellulose is esterified in order to render it soluble volatile organic solvents. This cellulose ester solution is then spun into air, a process

Industrial Rayon Corp., Covington, Va.

called *dry spinning*. Just about here, however, the similarity between the two processes ends and the acetate process offers many advantages over the older nitrate process.

In the acetate process the purified cellulose is esterified by means of acetic anhydride in the presence of sulfuric acid, which has a so-called catalytic action, and acetic acid, which acts as a solvent for the cellulose triacetate formed. When the reaction is complete, water is added to the batch, and the cellulose triacetate permitted to hydrolyze or split off a part of



Elizabethton, Tenn., might readily be called the artificial yarn center of America. American Glanzstoff Corp., plant

the acetate groups. Sodium acetate is added to neutralize the mineral acid present and the cellulose acetate precipitated by pouring the solution into a limited volume of water. The ester is washed well with water, the last traces of free acid neutralized by means of soda, washed again, and dried at a low temperature to the desired moisture content.

This dried cellulose acetate is dissolved in a mixture of several organic solvents, of which acetone is generally the principal constituent. This solution is filtered and deaerated, and is then ready for spinning immediately without any ageing, ripening, or other treatment.

The cellulose acetate solution is forced through a final filter, spinning pump, and a spinneret of rather large diameter into a tall, narrow, closed spinning chamber containing warm air, which evaporates the solvents present, leaving behind many individual filaments from each spinneret. These filaments are collected, oiled, and twisted in one operation, so as to give a yarn of 2.5 twists per inch without any further treatment.

The spinning solvent is, of course, recovered, as well as the excess of acetic acid used in the esterification of the cellulose. The above process is similar to that used by the Celanese Corporation of America for the manufacture of Celanese brand yarn at Amcelle, Maryland.

Advantages of the Acetate Process

It will be noticed that, while it was necessary in each of the previous processes to give the spun yarn a special treatment to remove nitrate groups, sulfur, or copper, as the case may be, the acetate type yarn is

ready for use immediately after it is spun, no other wet treatments being necessary. At the same time this acetate yarn is not a regenerated cellulose thread, as is the case of the other three types, but is composed of cellulose acetate.

There is no doubt that at one time the cellulose acetate process was the most expensive of the four methods in use for the manufacture of synthetic yarns, and the viscose process was the cheapest. As a result of research, chemical and otherwise, dealing largely with the recovery of the acetic acid and solvents used, very probably it is possible to manufacture Celanese brand yarn today at a lower total cost than any of the other synthetic yarns. This statement is supported by the recent statement of Dr. Henry Dreyfus, President of British Celanese, Ltd., that he would sell Celanese yarn for less than viscose yarn.

Responsibility In Loading Dangerous Material

Richelieu Case Decision Holds Loader Responsible

On January 4th, 1927, the French barque *Richelieu* was destroyed by a dust explosion of coal-tar pitch with which the vessel was being loaded. There was considerable property damage and a number of men were killed or injured. The vessel was being loaded by the Baltimore and Ohio Railroad and the Railroad was later sued by the vessel and by a number of the stevedores. The Railroad in turn impleaded the F. J. Lewis Company who had furnished the pitch as responsible for the damage, alleging that the coal tar pitch furnished was inherently "vicious and dangerous."

The original trial occupied four months in court and well-known consultants acted as experts for the parties involved. The ship was represented by Dr. W. B. D. Penniman, of Penniman and Brown, and Doctors Kouwenhoven and Whitehead of Johns Hopkins. The Baltimore and Ohio Railroad was represented by Mr. S. R. Church of New York City; Professor C. E. Adams of Harvard; and Dr. W. D. Patrick of Johns Hopkins. The experts for the Lewis Company were H. C. Porter, of Philadelphia and J. M. Weiss of Weiss and Downs, Inc.

In the original trial, Judge D. J. Coleman held that the B. and O. was not negligent because there was no knowledge that the pitch dust would explode and therefore dismissed the case both as far as the B. and O. was concerned and the Lewis Company was concerned. The case was appealed to the United States Circuit Court of Appeals, Fourth Circuit, and in unanimous decision Judges Parker, Northcott and Groner unanimously reversed the lower court as far as the B. and O. was concerned and upheld it in its decision as to the Lewis Company.

The following quotations from the decision of the Circuit Court of Appeals are of great interest as indicating the care imposed on the handlers of combustible dusts such as pitch in shipment and other commercial use. In considering the liability of the Baltimore and Ohio Railroad after reviewing the evidence, they state:

"With the general and common knowledge existent as to the explosive character of carbonaceous dusts in general, and with the information which the railroad might have obtained, and which it should have obtained when it held itself out as qualified to handle pitch, as to the explosibility of pitch dust in particular, there can be no question that it was guilty of negligence in operating sparkling electrical machinery and in sending open lights into a cloud of such dust. This conduct was directly in violation of the standards of care in dealing with dust prescribed by regulations which had been in force in England and several states of this union for a number of years, and, irrespective of regulations, was violative of the standards of caution which would suggest themselves to a mind of reasonable prudence having such knowledge of the danger of dust explosions as the officials of the railroad must be presumed to have had. The mere fact that they loaded coal with the same machinery and with similar open lights without explosion and that they had been assured that pitch would load like coal offers no excuse for the negligence. In loading coal the dust was kept down with the sprinkler system which was not used in loading pitch; and it is a matter of common knowledge that the danger of explosion in a dust cloud is dependent upon its acquiring the proper density. And the fact that no explosion resulted in the loading of coal is not conclusive that the methods employed were such as in the exercise of due care should have been used even there. Negligent methods of operation do not always or even generally result in disaster. The inquiry is not whether a method of operations has been used without disastrous results, but whether it is of such a character that danger of injury is reasonably to be apprehended from its use. Where the element of danger is present, successful operation is to be deemed 'fortunate rather than prudent'."

Later they dismissed the contention that the Lewis Company had any responsibility in a few words:

"As to the Lewis Company, the manufacturers of the pitch, we think that the court below properly dismissed it from the case. While there is some evidence that the pitch which it manufactured had a higher volatile content than certain other pitch handled by the railroad, there is no evidence that this rendered it or the dust created in handling it any more dangerous than any other pitch or pitch dust would have been. Pitch is not a dangerous substance, and there was no dangerous or vicious quality connected with this particular pitch which it was incumbent upon any one to communicate. Pitch dust, as we have seen, is dangerous just as is any other carbonaceous dust; but there is no more duty upon a manufacturer or shipper of pitch to communicate this fact than there would be upon a shipper of grain to communicate the fact that grain dust is explosive. The dust is not a vice of either pitch or grain. It is stirred up by the manner in which the pitch or grain is handled; and a shipper or manufacturer has the right to assume that a carrier or stevedoring company is familiar with the danger inherent in clouds of carbonaceous dusts and will protect against them accordingly."

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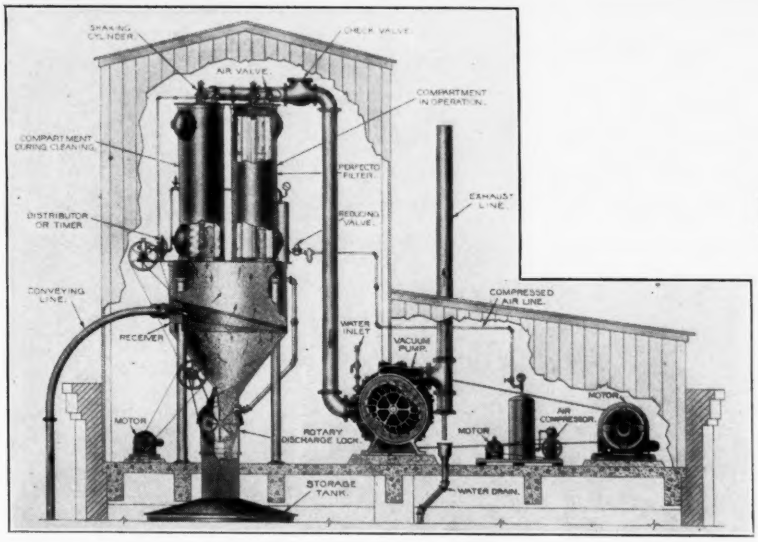
But times have changed. Nobody can now doubt this. The center of gravity of chemical operations has shifted from output that must be pushed to the limit of capacity to economy that must be squeezed to the limit of ability. Beat the market has become meet the price. And there are many reasons for believing that the general business conditions which have been acute during the past year will become chronic throughout the coming business generation.

Far from being a dismal outlook for our chemical industries this basic shift with its constant pressure upon prices is bound to create an economic opportunity markedly different, but quite as great, as the expansion we have been through. For the use of chemicals in industry is fundamentally one of the greatest savers of time and of labor, and these factors in industrial cost are certain to be welcome in many fields where chemistry and chemicals today play a minor role. Compare the ancient, six-months process of bleaching linen with the six-hour chemical operation used today, or reckon the cost of a prime calfskin against an equal yardage of keratol, and you then glimpse the vision of chemical opportunity that lies just before us.

This new chemical era is going to demand a different type of leadership in our chemical plant managers. Energy will be as vital as ever; but caution and foresight, and a flair for getting the most out of men and materials and equipment will all be at a premium.



Cross-section view of a complete unit of the suction type of pneumatic conveyor

Blowing Bulk Chemicals About the Plant

By E. H. deConingh*

PNEUMATIC conveying to transport bulk material from one location to another offers many advantages over mechanical methods; but it also has limitations which should not be overlooked. In general, pneumatic methods apply to bulk material, from 1½ inch pebbles down to powder, containing less than 3% moisture. Conveying distances up to 800 feet do not preclude economical handling, although the average length of pipeline is a great deal less.

The chief advantages of pneumatic conveying are:

1. Elimination of dust and fume hazards.
2. Reduction in labor through elimination of manual handling.
3. Reduction in material cost through purchasing in bulk (instead of in bags or other containers), and through elimination of dust and spill.
4. Conservation of space through compactness of receiving station and pipeline.
5. Flexibility of design, and ease of altering the material flow.
6. Improved working conditions.

The principal disadvantages are the higher cost of power to operate the system, and sometimes, the higher initial cost of the equipment.

The Human Factor

The capacity of a pneumatic conveyor is that volume of material per hour which can be conveyed under best conditions. Although a pneumatic system eliminates much manual labor, it usually requires an operator to handle the intake nozzle, and depends upon him to keep the tool immersed in the material. A variation of 20 per cent in capacity can easily be caused by the intelligence and industry of this operator. There are many delays in connection with the unloading of material such as switching and spotting of cars, opening of car doors, cleaning out corners, etc., which are sometimes overlooked when calculating operating time.

Therefore, a conveyor which could legitimately have a capacity of five tons per hour of material, could not be depended upon to unload a forty ton car per eight hour day. In selecting pumps, and motor horsepower, a theoretical capacity of 10 per cent to 25 per cent above actual requirements should be used, to allow a safe margin for the exigencies of everyday operation.

Relation of Vacuum to Nozzle Size

Suction type pneumatic conveyors are designed to operate at low, medium, or high vacuums, about one inch, six inches and eighteen inches of mercury, respectively. The cost of power to operate a high vacuum system is higher, per unit of material, than the lower vacuum systems, because of the increased friction loss from higher pipeline velocities.

But the high vacuum means small diameter hose and intake nozzle, a most important consideration for such applications as unloading box cars. A three inch diameter hose and nozzle, which can deliver up to ten tons per hour under average conditions at high vacuum is flexible enough to allow the operator to maneuver freely inside a car, while a six or eight inch nozzle for an equal capacity at lower vacuum is a very unwieldy piece of equipment. Furthermore, at high vacuum, less air is handled per unit of material, so the filter equipment to remove the dust from the conveying air is correspondingly reduced in size. Finally, a high vacuum conveyor permits the use of a liquid seal vacuum pump, which is less subject to abrasive wear than the positive displacement blower.

For grain conveying, and for the intra-factory transportation of some light, uniform materials, the low vacuum systems are highly satisfactory, but in the chemical industry, the pneumatic conveyor finds its widest use in the unloading of bulk chemicals from

*Technical Editor, The Dust Recovering & Conveying Co.

railroad cars, and for such applications the high vacuum type is usually the most logical choice.

A high vacuum conveying system consists of (1) intake nozzle or hopper, (2) flexible hose, (3) pipeline, (4) receiving station, (5) filters, (6) discharge mechanism, and (7) vacuum pump.

The intake nozzle is more than a length of pipe to be buried in the material to be conveyed. It fulfills the important function of mixing the particles with atmospheric air to form a proper concentration for best conveying performance. In order to permit regulation of this air volume, the nozzle shown in Figure 2 is a tube, within a tube. The free air flows through the adjustable inlet ports, down the annular space between the two walls, and reverses to enter the mixing chamber itself. It is apparent that the three inch hose and nozzle, shown in the photograph, permit the unloader to move about with comparative freedom in the car. For a fixed connection to a bin, a hopper, also with adjustable air inlet, is used.

Types of Hose

The connection between the intake nozzle and the pipeline proper is a hose, usually of rubber, because of its inherent flexibility. A pure rubber tubing of about ¼ inch wall thickness is protected by a helical wire armoring in a fabric casing of about ¼ inch wall thickness. The manipulation of the intake nozzle constantly changes the radius of the curves in the hose, so that wear is distributed over almost the full length. In addition, the rubber lining is resistant to abrasive wear, so the hose is assured a comparatively long life. Where it is necessary to change the hose and nozzle to different pipeline connections, cut-off valves in the line and quick detachable couplings aid rapid work.

Flexible metal hoses have been used with varying degrees of success. The greatest difficulty has been the tendency of the joints to corrode, with consequent loss of flexibility, but the use of corrosion resisting alloys may overcome this disadvantage.

Operating Efficiently

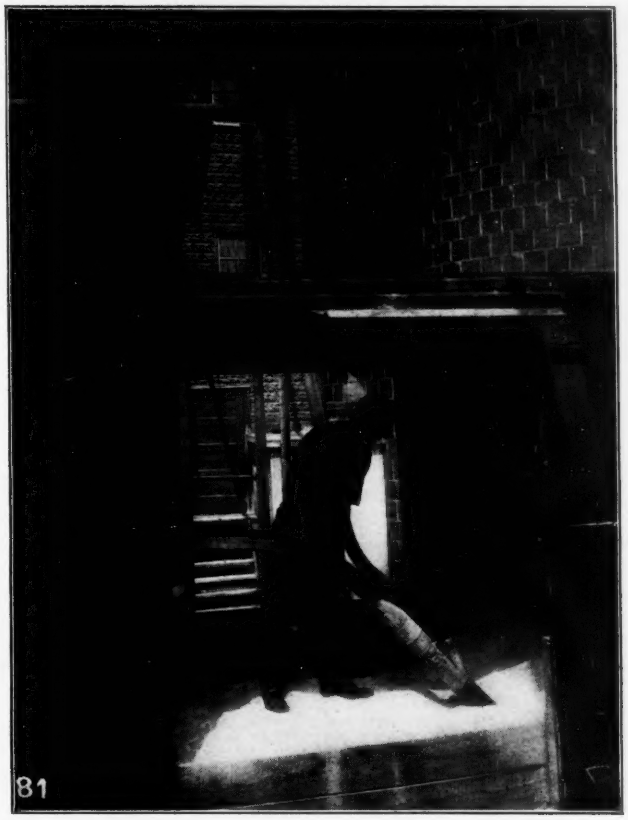
The use of a single hose and intake nozzle with each conveyor is preferred, but required capacity occasionally makes it advisable to connect two hoses to one suction line. There is some objection to this, because two operators frequently fail to cooperate perfectly, and a rush of atmospheric air to an idle nozzle reduces the capacity of the other. Experienced operators can avoid this trouble, however, and a special valve can be used at the junction of the two hoses to prevent the clogging of either line.

The pipeline itself consists of standard steel pipe, with tongue and groove flanges to assure accurate alignment. The cast iron fittings should be carefully machined inside to reduce the friction loss as much as possible. In the conveying of non-abrasive materials, the wear on straight lengths of pipe is negligible, but such materials as sand and crushed rock cause sufficient wear to require occasional pipe replacement.

Where it is necessary to change the direction of the pipeline, the bend is subject to wear, depending in severity upon the nature of the material and upon the air velocity. For non-abrasive materials such as soda ash, a pipe bend with a minimum radius of six feet, does not cause excessive abrasion or friction losses. Of course, the pipeline layout should be carefully designed to eliminate as many bends as possible, to maintain a minimum power consumption.

Abrasive Action Retarded

To convey materials such as sand, some kinds of ore, coal ashes, etc., pipeline bends must be designed to care for the inevitable abrasive action. A number of methods of constructing a suitable bend are in use, because different materials and pipeline velocities produce different effects. Rubber resists abrasion from some materials to a marked degree, so an extra heavy hose, built with ⅜ inches to ½ inches pure rubber tubing, is sometimes used. The power loss in this bend is low, because the cross section never becomes materially larger than the pipe cross section. Almost all of the wear occurs on that portion of the hose on the outside of the curve, so the whole hose can be twisted 90° three times before it must be replaced. This operation is simple, for the hose is simply strapped to the supporting channel.



Unloading ten tons of soda ash per hour through a three inch hose and nozzle. Note the absence of dust

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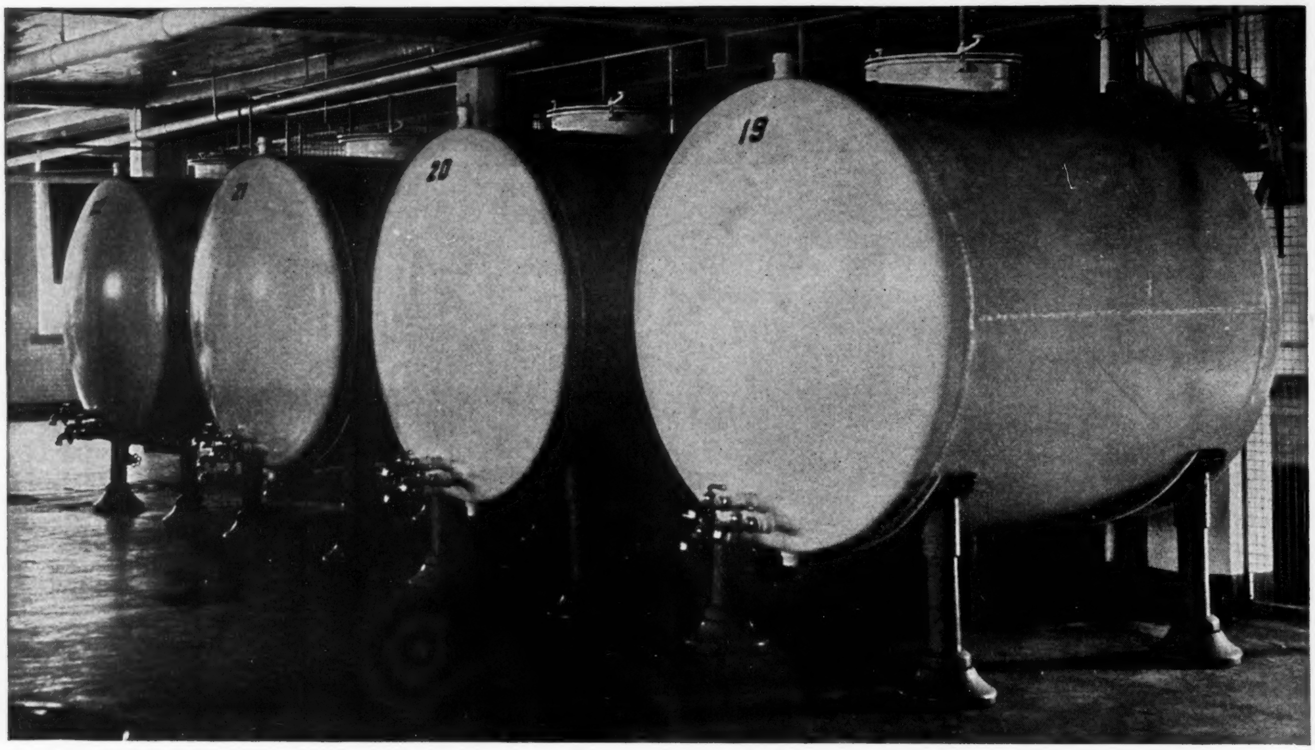

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Figure 4 "C" shows a standard steel pipe bend to which has been welded a box which is divided into several sections. When the abrasion has worn a hole in the pipe itself, the box quickly fills with material to form a cushion against further wear. The partitions

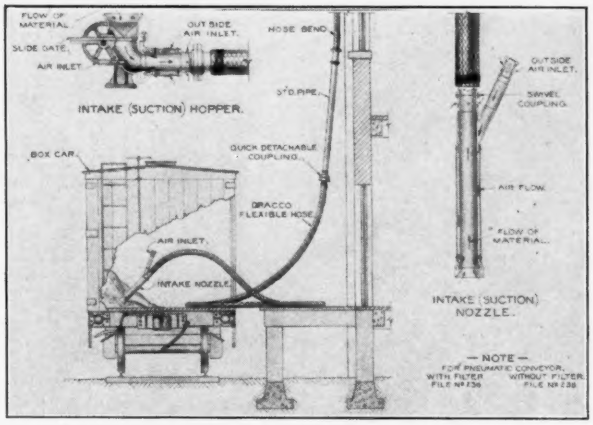


Figure Two shows intake nozzle, intake hopper and flexible hose

help to keep the material from falling out of the box, so the life of this bend is greatly extended at the expense of some power loss due to eddy currents.

Fittings for Equipment

The box in Figure 4 "D" is similar in theory, but affords a larger and differently shaped space for the material to deposit. Figure 4 "E" shows a still larger box which is filled with concrete before sealing. This makes a rather bulky fitting to ship and install, but works well in practice. The material will wear the pipe and concrete filling until the slowing up of the pipeline velocity causes a deposition in the cavity. When a balance is struck, further wear will practically cease. Of course, the pipeline friction loss is increased by the creation of eddy currents at these points, but this bend construction eliminates frequent replacement.

Figure 4 "F" is a cut-off valve, 4 "G" and "H" are standard Y fittings, machined inside to reduce the friction loss, and 4 "K" is the intake fitting which is attached to the receiver, to constitute the final portion of the conveying line.

The receiving station consists of a steel cylinder, four to eight feet in diameter, with a hopper bottom. A cast iron intake fitting is affixed to the tank to deflect the incoming air and material to a tangential path, and a removable plate provides easy replacement where abrasive wear occurs. The inside of the receiver is lined with a steel plate along a descending spiral path, and the material flow is deflected to follow this direction by a baffle plate. Both these plates can be replaced when worn, to protect the shell of the receiver proper.

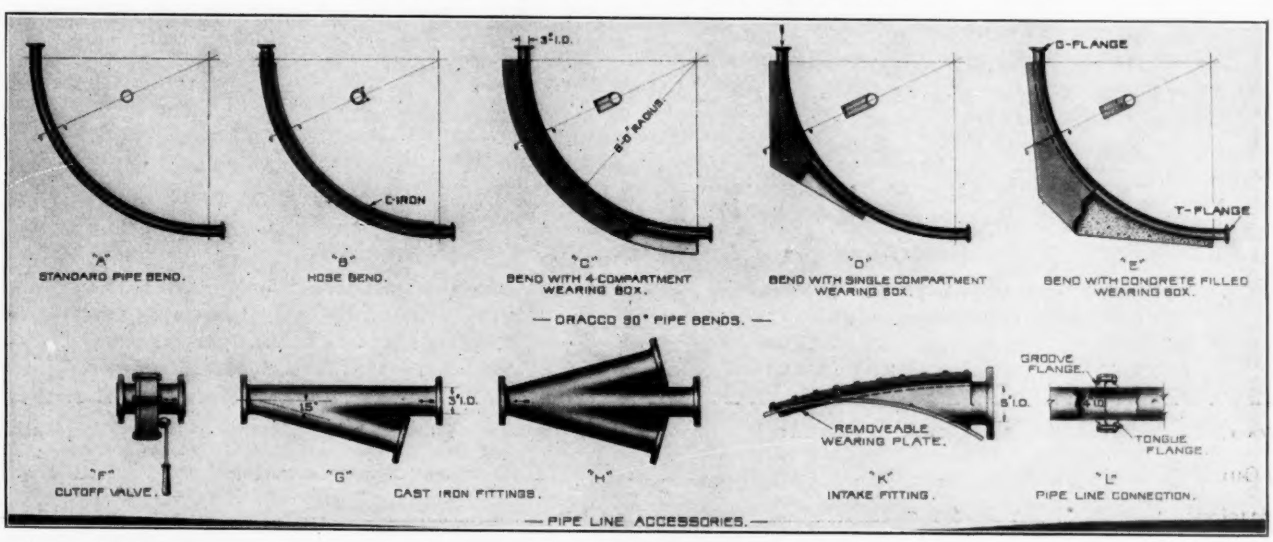
Filters Should Be Used

For conveying granular materials which contain little dust, or for conveying grain, where it is desirable to separate out the dust, a receiver without filters, is used. But it is seldom that such a system is completely satisfactory in operation. One of the chief advantages of the pneumatic conveyor is its dustless operation, and it is not logical to sacrifice this advantage by discharging a dust cloud from the vacuum pump. Some dust is created in pneumatic conveying of any material, and while there are some cases when the dust filters may be omitted with justification, these are much fewer than is generally believed.

In a very large majority of cases, the receiver should be equipped with filters. Figure 1 shows the compartment type bag filter generally used for this purpose. The number of compartments is governed by the volume of conveying air, since there is a definite ratio of filter surface to air volume for satisfactory operation.

The bags or tubes are open to the receiving hopper, and as the air is drawn up through the bags, the dust is retained on the inside surfaces, and only cleaned air is drawn off from the top of the filter cylinders to the

Figure Four shows special pipeline bends and fittings for equipment



IDEAS

THE LIFE-BLOOD OF INDUSTRY

"Research has no respect for business cycles"—forward-looking executives in the chemical industry recognize this fact. Competition, with them, has become a battle of the laboratories. They are "plowing back into the business" a reasonable sum, not only for future protection, but for worth-while ultimate profits as well.

Industrial America approves—invests $200,000,000 annually in research with savings estimated at twice that amount—has over 30,000 trained engineers in the service! A single midwest concern today employs several hundred research men to back up its dozen salesmen.

Largely because they "practice what they preach" Austin Engineers have rendered valuable assistance to many manufacturers in the design and construction of research buildings, laboratories and "proving grounds." Some examples of the results of Austin Research:

> Austin pioneered in the development of modern, single-story types of daylight plants . . . with their remarkable flexibility for straight-line production.
>
> Austin recently offered welded steel construction on a practical basis . . . actually at less cost than riveting for the first time in history. And now, this broad Austin experience has been applied to a new and revolutionary type of plant design and operation . . . a $2,500,000 project under construction today . . . where startling reductions in costs will be made. Austin Engineers, with their own, plus experience in helping a number of manufacturers properly house their research operations, can offer you helpful suggestions and provide proper and adequate facilities, compatible with your needs and the investment which is justified.

More than half a century of experience has prepared Austin for the solution of your building or modernizing problems . . . whatever they may be . . . wherever they may be. Ask Austin for facts and figures. There's no obligation. Phone, write, wire or use the handy memo below.

THE AUSTIN COMPANY

Engineers and Builders - - Cleveland

NEW YORK CHICAGO DETROIT NEWARK
PHILADELPHIA CLEVELAND CINCINNATI
PITTSBURGH BOSTON ST. LOUIS
SEATTLE PORTLAND

THE AUSTIN METHOD

THE AUSTIN COMPANY OF TEXAS: DALLAS
THE AUSTIN COMPANY OF CALIFORNIA, LTD.: LOS ANGELES, OAKLAND AND SAN FRANCISCO
THE AUSTIN COMPANY, LIMITED: TORONTO

Memo to **The Austin Company, Cleveland ☐Send copy of booklet "101 Questions That Should be Answered Before You Build."**

☐ Our Door is open to New Ideas! We are interested in a..........................project of approximately..........................sq. ft.

Location..........................Individual..........................Firm..........................City.......................... CM-5-31

vacuum pump. An automatic cleaning mechanism is provided, so that at regular intervals, the air flow is cut off from each filter, and the whole set of bags is agitated vigorously to shake down the burden of accumulated dust. The left hand compartment in Figure 1 is being cleaned, while the right hand compartment is in operation.

The mechanism to provide regular discharge of the conveyed material, without permitting the return flow of atmospheric air is a very important feature of the system. For low vacuum systems intermittent discharge locks, operated by the weight of the material, are sometimes used, but a continuous operating feeder is more satisfactory for a high vacuum system. In a rotary type discharger, consisting of a rotating spider divided into a number of compartments, which receive the collected material, and dump it to a chute or bin, there is never any direct connection between the receiver and the atmosphere, and the volume of free air returned to the receiver is little more than the volume of discharged material.

Adjustable bearing blocks provide for take-up as wear occurs, and this type of discharge lock functions well on non-abrasive materials such as soda ash, lime, clay, etc.

For conveying of sand, crushed rock, ashes, etc., this rotary lock is not satisfactory, for the gritty particles cause too much wear between the moving parts. A gate type discharger has been developed for this service. Three sets of gates are actuated by a master cam to pass the material through in successive stages. One set of gates is always closed, so there is no return flow of atmospheric air. The gates are lined with rubber, and close against hardened seats, so there is little opportunity for destructive wear.

The positive displacement type blower is used frequently for inducing the partial vacuum in a conveying system, and has proven satisfactory. But the liquid seal type of pump is less subject to wear on the rotary parts. In this type a rotor consisting of a circular casting with projecting blades is caused to revolve in an elliptical casing filled with a liquid, usually water. The water turns with the rotor, but follows the casing, due to centrifugal force. Twice a revolution the water alternately recedes from and reenters the rotor, and this reciprocating action causes the compression of the air which is admitted and expelled from the compartments of the rotor. For producing negative pressures of 12 to 22 inches of mercury, this pump is probably the most efficient available device.

New Incorporations

Baressy, New York, chemicals, W. L. Post, 200 shs. com.

A. K. Manufacturing Co., New York, chemicals, Delacey & Hamerling, 100 shs. com.

F. Trau, New York, chemicals, J. A. Doccia, $20,000.

Utility Drug Products, New York, chemicals, J. F. Raskin, $20,000.

Hamilton Chemists, New York, chemicals, B. Antin, 200 shs. com.

Lacey-Rowley Chemical Co., Buffalo, $25,000.

Mervin I. Robins, Mineola, chemicals, A. Waldman, $10,000.

Equipment Bulletins

The Dust Recovering & Conveying Co. has just issued a booklet describing their installation for coal dust recovery at the Toronto station of the Ohio Edison Co.

A new bulletin entitled "Dieform Compression Fittings" is now being distributed by the Bailey Meter Company, Cleveland, Ohio. The bulletin which is designated as No. 13, fully describes the application, advantages and installation of Dieform Compression Fittings when used with copper or steel tubing for small service lines. The material is recommended for piping where many bends must be made and where an absolutely tight, neat appearing, trouble free installation is required. It is especially suitable for high pressure and high temperature service such as connections to metering equipment and water, oil, steam, compressed air, and gas lines.

One section of the bulletin describes Dieform Test Water Cooling Coils with which representative boiler test water samples may be easily and efficiently obtained.

Toch Bros., Inc. has prepared a very unusual manual to enable those officials responsible for plant maintenance to determine easily and readily the most suitable paint or compound for each requirement in the plant.

Hercules Powder Co. has issued a booklet entitled, "Commercial Explosives, Their Safe and Proper Use."

Link-Belt Co. has mailed out a new booklet No. 1293 entitled "A Saving at Every Turn" describing in detail seven types of positive drives for the transmission of power.

The Plant Management Department of Chemical Markets will be glad to forward requests for the above booklets to the proper channels for attention.

German Fertilizer Exports

German exports of fertilizers dropped severely during 1930. The I. G. has felt the effect of this keenly. Loss of nitrogen markets represents a serious economic problem for Germany's leading chemical producer, inasmuch as the value of the nitrogen output is equivalent to approximately twice that of the next major group, namely, dyes. Nitrogen production capacity at the Leunawerke is 650,000 tons annually, and at Oppau 125,000 tons annually.

Of the two plants the Leunawerke was the most seriously affected, as its principal product is ammonium sulfate. Production at Leuna in the off season fell to almost one-third capacity, but later increased to around one-half capacity.

Total export figures for all plants are as follows:

	Metric Tons	
	1929	*1930*
Ammonium sulfate	726,814	463,683
Calcium nitrate, urea and miscellaneous nitrogen compounds	494,337	308,982
Ammonium phosphate nitrophoska and sodium phosphates	50,831	36,475
Ammonium chloride	23,637	21,633
Sodium nitrate	69,411	65,196
Potassium nitrate	14,070	9,712
Ammonium and lead nitrates	28,535	26,000
Nitric acid	29,113	23,269
Total	1,436,748	954,950

Leunawerke has inaugurated a schedule of fewer weekly hours for its "change shift," or part-time workers beginning next week.

About 4,000 of these employes are now on a 42-hour a week basis in place of the present 48-hour arrangement. Leunawerke ordinarily curtails operations early in the year after a period of active production to meet spring fertilizer needs.

SAFETY

In Handling Compressed Gases

Actual experiences, many of them unfortunately serious, have taught how and how NOT to handle compressed gases. The growth in the use of such gases as chlorine, oxygen etc. has forced upon a somewhat reluctant clientele the necessity for safety measures.

By Robert Hugh Ferguson*

THE growing use of compressed gases in industry has given increasing importance to the problem of their safe handling. The problem is a complicated one, because of the wide variety of commercial gases and their extensive use in so many diverse industries.

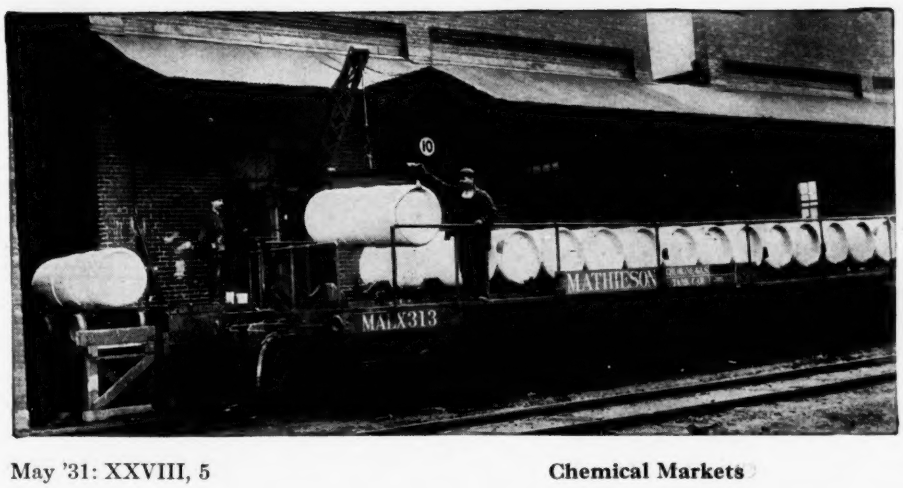
Accidents which occur in the handling of compressed gases often develop into severe ones. They may result in serious or fatal personal injuries, and often in excessive costs in loss of materials and in the interruption of plant processes. There is often a health hazard which should receive serious consideration.

Since the subject is a rather broad one, consideration centers chiefly in hazards of the handling compressed gases in cylinders which may be transported. Of course many of the accident prevention problems and safety methods relating to the use of compressed gas in cylinders likewise would apply to compressed gas when piped into the consumers plant under pressure or where manufactured by the consumer.

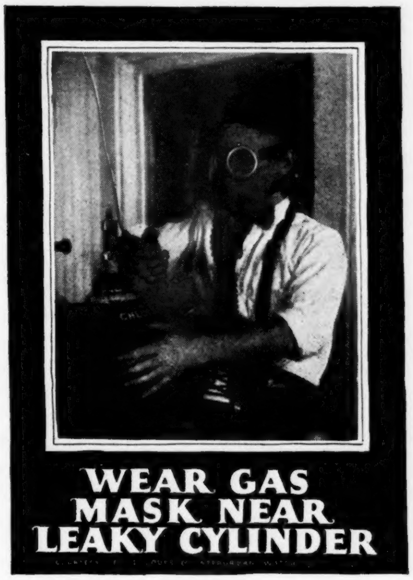
A number of important factors are involved in the outline for a safety program for handling of compressed gas cylinders. These include the purpose and the reliability of the cylinder, the transportation and distribution of the cylinder, the safety qualities of the special appliances needed to utilize the contents of the cylinder, provisions for adequate inspections of all quarters where cylinders are being used, the disposal of cylinders, and the training of plant personnel concerned in the safe handling of cylinders and compressed gases. The plant inspections, and the training of the plant personnel also should be conducted by those with a thorough knowledge of the health hazards in the use of the various gases.

It is quite fortunate that two strong agencies are cooperating in the program of safety in the manufacture of compressed gas cylinders and in their transportation when under pressure or empty. It is of interest that even before the formulation of the high safety standards developed by the Interstate Commerce Commission through the Bureau of Explosives of the American Railway Association, that high standards were being maintained through the Compressed Gas Manufacturers Association. At that time, (twenty years ago) when a person wished to buy

*Safety Engineer, National Safety Council



The development of the multiple unit chlorine tank-car was a forward step in the safety campaign



National Safety Council posters stress the necessity of the little items of safety that when neglected cause untold misery and financial loss

cylinders for compressed gases he simply went to the manufacturer and asked the price, and left the responsibility entirely with the manufacturers. These manufacturers were not subject to any outside control, through the Bureau of Explosives or any other agency.

Today the manufacture of cylinders for explosives is closely regulated, since these cylinders must meet the safety requirements set by the Interstate Commerce Commission, exercised through the Bureau of Explosives of the American Railway Association. The Compressed Gas Manufacturers Association is unique, since it is concerned only with trade practices which involve questions of safety. The Association is constantly working through committees for the purpose of developing further protection of the cylinders even after they have passed out of the hands of the manufacturer into the hands of the customer. This is done to protect the customer at all times and to maintain the condition of the cylinder while in use.

The viewpoint of the Compressed Gas Manufacturers Association was expressed a few years ago before a meeting of the Chemical Section of the National Safety Council, at an Annual Safety Congress, by Major John C. Minor. "I do feel that," said he, "speaking for the gas industry and speaking for the cylinder manufacturers, we find that it pays to be safe. It costs money—it costs a good deal more to make the modern cylinder today with all the precautions surrounding it than it did the old one, but every one involved in the question agrees that it pays to be good."

From the accident prevention viewpoint, compressed gases which are supplied to the customer in cylinders should be delivered only in cylinders which are manufactured and maintained in accordance with the specifications of the Interstate Commerce Commission. These cylinders likewise should be charged with gas and marked in accordance with these regulations. Also, the special precautions which are specified for the transportation of flammable gases should be observed. This should include the "red label" (for flammable gases), in contrast with the "green label" required for non-flammable gases.

The director of a safety program which relates to the handling of compressed gases also should give close attention to all state rules and regulations, all local ordinances and insurance requirements. It is important that the I. C. C. specifications should be complied with even though the gases to be handled are designated only for local use and will not be shipped by rail.

As a rule it will be generally known that special safety precautions are taken in the manufacture of cylinders for compressed gases. This knowledge may have strange results. It even may represent a hazard, since the employees who use these cylinders may develop the habit of placing too much dependence on the safety reputation of the cylinder. For example, such cylinders are often put to queer uses. They have been used as rollers in the moving of heavy machinery, houses, and as supports for the piling of heavy materials.

The safety program in the handling of cylinders should be based on the principle that it is the exceptional cylinder which causes most of the trouble. For instance, it was reported some time ago in the Philadelphia newspapers that a truck partially loaded with compressed gas cylinders went over a high embankment. The truck was demolished, but the cylinders of oxygen were unharmed and were delivered to and used by the customer.

It is an engineering principle that a metal when subjected to hammering is always weakened. For this reason, even though cylinders have been well constructed and thoroughly tested, they should always be carefully handled. This emphasizes the rule that a lifting magnet should never be used in handling cylinders, since if the electric power should fail the cylinders would drop and a rupture might result. For the same reason a rope or chain sling should not be used for moving containers because of the possibility of a cylinder slipping and falling. If a crane is needed to move cylinders a safe cradle or platform should be provided with a separating bar in the middle and the cylinders should be lashed firmly together to prevent vibration and striking one against the other.

It is important to keep in mind the distinction between the hazard from an explosion of a gas in a cylinder, and a so-called "explosion" caused by the rupture of a cylinder. In technical terms, an explosion is described as a rapid chemical reaction, usually caused by heat or ignition and resulting in rapid and violent expansion. This distinction between the possible causes of accidents only emphasizes, from the technical viewpoint, that the plant safety program to lessen hazards in the handling of cylinders should include a

variety of inspections and precautions. Special precautions must be taken to avert cylinder rupture, to check gas leakage, to guard against ignition, to prevent chemical reactions from the contents of the cylinders.

In addition to the safety specifications of the Interstate Commerce Commission, and the rules which have been provided by the Compressed Gas Manufacturers Association, a committee of seventy-five safety engineers working together as one of the cooperative units of the National Safety Council has assembled for the first time in a compact booklet detailed safety suggestions, published under the title of "Safe Practices in Handling Compressed Gases."

It is suggested, as a first principle, that gas cylinders should never be abused or mishandled. Special precautions should be taken in lifting and transporting them. Empty cylinders should be grouped separately from full containers; and before they are shipped all the cylinder valves should be closed and the protecting caps securely placed. Cylinders that cannot thus be protected, if they should contain combustible or noxious gases, should be crated before shipping.

It is suggested, as a precaution while cylinders are on the job but not actually in use that the protective cap should be kept in place except when an outlet appliance is connected. Special care should be taken to prevent cylinders from being accidentally tipped over, and a practical cylinder clip rack has been devised for this purpose. Consumers are especially warned that gases should not be mixed in a cylinder, and that the cylinder should be filled only by or with the consent of the owner and with careful attention to all I.C.C. regulations.

All alterations or repairs to cylinders should be left to the manufacturer. All markings on cylinders should be maintained clear and legible. It is specially important that threads should always match in making connections and that such connections should never be forced. The habit should be developed of opening all cylinders and cylinder valves slowly. Care should be used in reducing the pressure of cylinders when the compressed gas is to be used. When a valve cap is removed, the valve should be opened for an instant to clear the opening of particles of dust or dirt, but in opening a valve it should always be pointed away from the body.

It is important, in attempting to stop a leak between a cylinder and the regulator by tightening the adjusting threads, that the cylinder valve first should be closed.

Precautions should be taken not to allow sparks, molten metal, electric current, or flames to come in contact with a cylinder and its connection. The interchange of equipment that has been used for one gas, to a cylinder of a different gas should never be permitted.

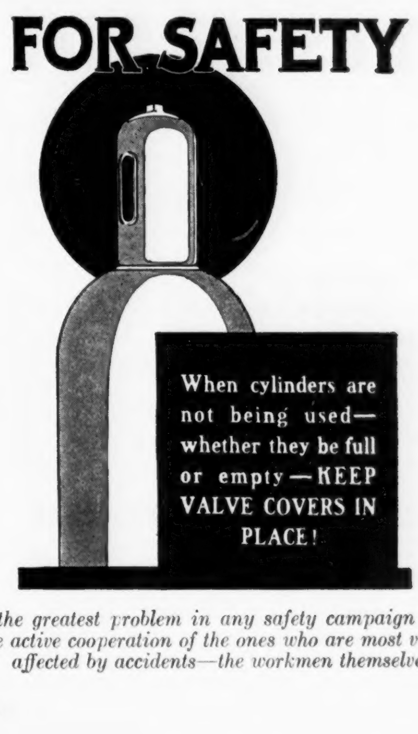
There are a number of common-sense precautions which should be observed in storing cylinders. They should be protected against excessive variation of temperature. This means, in the winter, that cylinders in the open should be protected against the accumulation of ice or snow; and in the summer they should be protected against the direct rays of the sun. As a special precaution against fire, where a considerable number of cylinders are stored, there should be special storage places segregated or cut off by fire resisting and heat resisting walls or partitions.

Likewise, the cylinders should not be stored near elevators or gangways, or in locations where moving objects may strike or fall upon them. It is good practice to store full cylinders and empty cylinders in different groups. Also cylinders should be stored in dry places and kept away from salt or other corrosive chemicals or fumes. And they should never be exposed to continuous dampness. It is important that compressed gas cylinders should never be used for any purpose other than as containers of materials for which they were especially designed.

There is always danger in a plant, where any form of "horse play" with compressed gases is permitted. Many serious and fatal accidents thus have been caused, including many eye injuries. Likewise injuries have been caused through the use of compressed gases to dust off one's clothing.

The personnel factor is always important, in developing a plant program for safety with compressed gases. It is a good plan, when receiving charged cylinders or shipping empty cylinders, that this work always should be in charge of an experienced man. All workers with, or in the vicinity of the use of compressed gases, should know the possible seriousness of accidents which may be caused from the improper use of these materials.

Several manufacturers of compressed gas and compressed gas equipment have made a specialty of concise sets of rules relating to their products which may



Perhaps the greatest problem in any safety campaign is to obtain the active cooperation of the ones who are most vitally affected by accidents—the workmen themselves

Important Gases and Some Characteristics

	Gas	Physical State as Shipped	Effect When Breathed	Flammable	Flammable Range with Air (%)
1.	Acetylene	Dissolved	Anaesthetic	Yes	2.5 to 80.0
2.	Ammonia	Liquid	Irritant	Yes	16.0 to 26.0
3.	Butane	Liquid	Anaesthetic	Yes	1.6 to 6.5
4.	Carbon dioxide	Liquid	None	No	None
5.	Chlorine	Liquid	Irritant	No	None
6.	Ethylene	Liquid	Anaesthetic	Yes	3.0 to 34.0
7.	Ethyl chloride	Liquid	Anaesthetic	Yes	4.3 to 14.8
8.	Helium	Gas	None	No	None
9.	Hydrogen	Gas	None	Yes	4.1 to 75.0
10.	Hydrogen cyanide	Liquid	Toxic	No	None
11.	Methyl chloride	Liquid	Anaesthetic	Yes	8.3 to 19.7
12.	Nitrogen	Gas	None	No	None
13.	Nitrous oxide	Liquid	Anaesthetic	No	None
14.	Oxygen	Gas	None	No	None
15.	Propane	Liquid	Anaesthetic	Yes	2.1 to 7.5
16.	Sulfur Dioxide	Liquid	Irritant	No	None

be posted for educational purposes in shops and plants. A number of the large companies—for example, the General Electric Company—have prepared pocket "Safety Rules for Gas Equipment" for distribution among employees. Posters of the National Safety Council are also of value in conveying a continuous safety message.

A further precaution against hazards from compressed gases is protective clothing. For example, where ammonia or chlorine is used in plant operations gas masks should always be in readiness for possible emergency. This implies of course that care should be taken to keep these masks always in good condition, and to see that all workers have been trained in the proper use of such equipment.

With this article is reproduced, from "Safe Practices In Handling Compressed Gases," a tabulation of sixteen important gases which are being used in large quantity in industry. The table, shown on this page, also indicates the physical state of the gas as shipped, the effect when breathed, whether it is flammable, and the flammable range with air. It is important that the safety engineer should know the characteristics and the hazards of all gases which are used in his plant, and he should know the specific methods of protection against each gas. Special effort then should be made to pass on to the foremen and to the workmen the essentials of this information. This should include health education. Health education in turn implies the need of frequent health examinations for workers in plant processes where gases which may be especially injurious are used. The management in many plants has found it a good investment to give physical examination previous to employment, supplemented by periodic subsequent examinations. It has been stated by the Director of the Industrial Health Division of the National Safety Council that 60 per cent of all his industrial health correspondence relates to chemical health hazards. And many of these health hazards are in proceses which depend on the handling of compressed gases.

A thorough plant program of safe practices in the use of compressed gases usually will make possible a high percentage control of these hazards. This statement is supported by the fact that in many chemical plants, and in many plants which use compressed gases, accidents from this source have been almost entirely eliminated.

Canadian Incorporations

The Dominion Webbing Company, Ltd., of Kingston, Ont., 1,500 no par shares, textiles, William F. Nickle, John M. Hughes, and Augusta C. Hanley.

The A. C. Barnes Company, Ltd., of Montreal, Que., 1,000 no par shares, chemicals, Claude S. Richardson, Francis G. Bush, Alfred J. Martin.

Zonite Products Coproration, Ltd., of Montreal, Que., 1,000 no par shares, pharmaceutical products, Claude S. Richardson, Francis G. Bush, Alfred J. Martin.

Rite-Wate International, Ltd., of Windsor, Ont., 100,000 no par shares, medicines, Elmer J. Cousino, William H. Kilpatrick, Frederick Pound.

Silks Ltd. of Toronto, Ont, 12,000 shares of no par value, textiles, Harold F. McMullen, Ethel L. H. Scott, Grace D. Connell.

George H. Hirst & Company of Canada, Ltd., Carlton Place, Ont., $500,000, textiles, Charles D. Magee, Ernest H. Stewart, Edwin C. Snelgrove.

Rayon News

The Seitifico Italiano Rayon Works of Turin, a member of the Snia Viscosa group, has taken over control of the Commercio Industria Maglieria Affini works of Turin having a capital of 1,000,000 lire.

Italian rayon production last year totaled 66,307,000 pounds, as compared with 71,060,000 pounds in 1929, according to official statistics received from Trade Commissioner Elizabeth Humes at Rome. Exports for the year are placed at 44,185,000 pounds, approximately 67 per cent of the output, declared to be practically the same as the preceding year.

Despite the favorable volume of exports and the comparatively small reduction in output, the report stated, Italian rayon producers during the year felt the pinch of keener world competition and lower prices, it is indicated by preliminary reports from the principal companies showing that no dividend is to be declared on 1930 earnings.

Chemical Facts and Figures

1930 U. S. Dye Census and Imperial Chemical Industries Annual Report Reflect World-wide Industrial Curtailment—C. S. Munson New U. S. I. President—Mellon Finds "No Dumping" of Saltcake —Greensfelder, Hercules Powder, Dies.

The issuance in this country of the "Preliminary Report of the Census of Dyes and Other Synthetic Chemicals," by the U. S. Tariff Commission (April 15), and the speech of Sir Henry McGowan, I. C. I. chairman, at the fourth annual general meeting held in London (April 2) served to focus attention on the degree of restricted activity that has prevailed in the industrial chemical industry here and abroad for the past fifteen months.

Dye Production Less

Briefly summarized the outstanding features of the preliminary report of the Census of Dyes and Other Synthetic Organic Chemicals in 1930 are:

1. A production of 86,585,000 pounds of dyes in 1930, representing a 22 per cent decrease from the peak output in 1929.
2. Sales of 89,867,000 pounds of dyes valued at $38,670,000, representing a decrease of 15 per cent by quantity and 16 per cent by value from sales in 1929.
3. Increase of 23 per cent in sales of unclassified and special dyes.
4. Decrease of 15 per cent in sales of domestic dyes of all classes, but decreases of only two per cent for vat dyes, other than indigo, 5 per cent for lake and spirit-soluble, 6 per cent for direct, and 10 per cent for basic dyes. Heavy decreases occurred in the mordant and chrome class (30 per cent) and sulfur dyes (24 per cent).
5. Sales exceeded production by 3.8 per cent in 1930, while in 1929 production exceeded sales by 5 per cent.
6. Decrease of 18 per cent in exports from 1929.
7. Decrease of 36 per cent in imports from 1929.

The decrease in production and sales of dyes in 1930, as compared with 1929, was less however than the decrease in either of the depression years 1921 or 1924. A 55 per cent decrease in production and 59 per cent decrease in value occurred in the depression year of 1921 over 1920. A new production record was reached in 1923 followed by a 27 per cent decrease in production and a 26 per cent decrease in sales value in 1924. Since 1925, production and sales have gradually increased each year to a new record in 1929.

In 1930, dyes of domestic production supplied about 94 per cent of our consumption by quantity and about 90 per cent by value in 1929. There was in addition an exportable surplus of the bulk low-cost colors amounting to 28,000,000 pounds.

The weighted average price of all domestic dyes sold in 1930 shows virtually no change from the average for 1929. Average weighted price in 1930 was 43 cents, 42.6 cents in 1929, and 43 cents in 1928. In 1917 the average unit value of production was $1.26, in 1920, 99 cents, and in 1921, the average unit value of sales was 83 cents.

McGowan Reports

Addressing the first general gathering of stockholders held since the death of Lord Melchett, Sir Harry McGowan after briefly referring to the severe loss suffered through the untimely passing of the former chairman, bravely launched into a detailed discussion of the present depression and a comparison of conditions in England, Germany and this country. Speaking of some of the present difficulties in merchandising chemicals Sir Harry said:

"The products which our companies manufacture are largely what may be termed secondary commodities—that is to say, they are not consumed by the general public as such, but form a part of the raw materials of a large number of other industries. Many means of stimulating consumption which are open to manufacturers dealing more directly with the individual consumers are closed to us because our demand arises at the intermediate stage of production."

Commenting on the prospects of the dyestuffs industry he said, "I feel that in taking this action (Renewal of the Dyestuffs Act) Parliament has acted very wisely. The dyestuffs industry, although neither large in respect of its turnover nor particularly remunerative to those engaged in it renders a great national service and I hope that nothing will be done to hinder its continued development."

World Nitrogen Situation

Sir Harry then devoted considerable time to a review of the agricultural picture and the relationship of the Billingham nitrogen fixation plant to the international nitrogen situation, denying the rumors that the plant was shut down and its process antiquated. He rather placed the cause of the drop in consumption of ammonium sulfate and sodium nitrate mainly to a drop of 22 per cent in the index of prices for world-wide agricultural products. He called attention to a rather novel situation when he said that, "The situation has been further aggravated by the absurd lengths to which economic nationalism has been pushed by the erection of new plants in many of the smaller European countries on the ground that they must be self-contained in this branch of production." The relationship of the I. C. I. with the I. G. and the German Nitrogen Syndicate he reported as being entirely satisfactory and the prospects for the renewal of the one-year-old world wide nitrogen restriction pact as bright.

Soviet Threat

Considerable attention was given to the threat of the Soviet Five-Year Plan. "Russian competition has begun to affect our trade, particularly in the Far East and South America. Communistic in its base, this competition rests on labor conditions and a standard of living which have no parallel in any other country carrying on international trade" . . . "If that movement (a rise in standing of living in Russia) is stifled, dumping competition carried to extreme runs the danger of provoking common action by the great industrial nations of the world designed to protect their own trade against export methods which appear to be inspired more by bad feeling than by good."

Sir Harry then made a vigorous plea in defense of large research appropriations, suggested several necessary internal re-arrangements of company responsibilities,

—The Fertilizer Review

described labor relations as satisfactory and finally related some of the advances made during the year in the commercial application of the hydrogenation process and closed with a note of confidence in the speedy return of better business conditions nationally and internationally and in the sound stability of the I. C. I.

The most outstanding feature of his entire speech was the description of the international activity of the I. C. I. and participation in ownership of foreign companies. Here is seen at once the strength of the organization and the large degree of dependence it must place on its foreign business in striking contrast with the relatively small amount of export business done by the leading chemical producers in this country. In Australia and South Africa noteworthy gains were made during the year. In Canada, Canadian Industries, jointly owned and controlled by the I. C. I. and the duPont interests, showed but a very trivial drop both in volume and earnings in 1930.

One remark of McGowan is certain to provoke considerable comment and possible discussion. "Generally speaking, in the chemical industries it is more economical to have spare capacity than to carry excess stocks." The I. C. I. unquestionably is weathering in splendid fashion a most trying period less than four years after its formation and before much of the internal reorganization could be successfully concluded. A summary of the financial aspects of the report will be found in the financial section.

Washington

The United States Supreme Court became the center of interest in chemical circles in Washington as several important decisions were handed down during the month.

The Supreme Court will reconsider the controversy between Carbice Corp. of America and American Patents Development Corp. and Dry Ice Corp. of America, so that it may pass upon the validity of the Slate patent under which the last named corporation is licensed, and which has to do with the "locational arrangement, in an unpatented container, of a specific unpatented refrigerant (solid carbon dioxide) relative to foodstuffs to be refrigerated.

Chemical Foundation Suit

German owners of patents which were seized by the Alien Property Custodian are not entitled to recover royalties which were incurred prior to seizure, when the patents were used by American manufacturers under licenses granted by the Federal Trade Commission in accordance with the provisions of the Trading With Enemy Act. This was the decision in case of Farbwerke and others against Chemical Foundation, Inc., and others.

Agreements for the licensing of "cracking" patents in the manufacture of gasoline were held by the United States Supreme Court not to have resulted in monopoly or restriction of competition (April 13).

The important decision marked the failure of the Government to substantiate its charges that the Standard Oil Co. of Indiana and forty-nine other corporations are restraining trade and attempting to monopolize commerce in gasoline through the use of patents for "cracking" petroleum to produce gasoline.

The Department of Justice has been asked to investigate by Congressman Patman (Dem., Tex.) the P & G purchase of the Portsmouth Cotton & Oil Refining Co. and the Department has asked for the dissolution of the Sugar Institute, Inc., and a permanent injunction against fifty corportions charging the Institute is a violation of the Sherman Anti-Trust Act.

At an initial hearing upon the resolution of the Senate to investigate the matter of a tariff on copper, the United States Tariff Commission through its chairman, Henry P. Fletcher, stated that it contemplated the preparation of a detailed report showing the cost of producing copper here and abroad, and added that the commission would also receive other information bearing upon this general subject such as domestic production and its relation to domestic consumption.

Secretary of Treasury Mellon has found that there is no justification for issuance of a dumping order against importation of salt cake from Germany.

Complaint was made against imports of salt cake produced in Germany by the Sodium Products Corp. and Myles Salt Company.

Personal

L. W. Hutchins, director of public relations, Swann Corp., and a director of The American Institute, was in charge of the arrangements of the American Institute Science Dinner held April 9 at the Hotel Aster, New York.

David Lawrence, Editor The United States Daily, delivered a radio address recently over the N.B. C. network on "The Government and the Chemical Industry".

Dr. Harrison E. Howe, editor Industrial and Engineering Chemistry, was the principal speaker at the annual meeting of the Purchasing Agents Association held recently in Chicago. His subject, "Science in the New Competition," was a non-technical discussion of various articles capable of performing the same service competing for the consumer's dollar.

Personnel

The United States Advertising Corp. of New York and Toledo announces that Marshall Beuick has been put in charge of the Publicity Department at the New York office. He was recently with Hommann, Tarcher and Sheldon, Inc., and previous to that was in charge of the advertising and publicity of The Barrett Company's chemical division.

William P. Pickhardt, long associated with the chemical trades as a member of Kuttroff, Pickhardt & Co., is president of the Unyte Corporation, a newly formed organization which holds patent rights and processes relating to the production of urea synthetic resins.

At an organization meeting of directors of Atlas Powder held in Wilmington, Isaac Fogg and W. T. Penniman were elected vice presidents. Mr. Fogg will also continue in the office of Secretary and Treasurer. Other officers were re-elected.

The appointment of Leslie S. Gillette as advertising manager of the U. S. Industrial Alcohol Co., and its subsidary, the U. S. Industrial Chemical Co. Inc., has been announced by Glenn Haskell, vice-president of the parent company.

In additon to the advertising responsibilities Mr. Gillette will head the sales promotion department of PYRO, the denatured alcohol, widely used as an automobile anti-freeze and numerous industrial purposes.

Mr. Gillette joins U. S. Industrial Alcohol after being three years with the J. Walter Thompson Company, advertising agency. In his past connection he was an assistant-representative on several automotive and industrial accounts. Among these was that of the U. S. Industrial Alcohol Co.

Mr. Gillette's experience in the automotive and industrial fields goes back to 1922 when he joined the Chilton Class Journal Co., publishers of automotive business papers.

James F. Walsh, formerly Vice President and Technical Director, Celluloid Corp., has joined the consulting staff of Arthur D. Little, Inc., of Cambridge, Massachusetts.

J. G. Richards and R. P. Weber, formerly branch managers for the L. H. Butcher Co., at Portland and Seattle respectively, have severed their connections to become associated with Mr. A. W. Cooper in the new firm of Cooper, Richards & Weber, Incorporated, in which capacity they plan to continue to service the trade.

Obituaries

Nelson S. Greensfelder, advertising manager of Hercules Powder Company and nationally known authority on industrial advertising died April 5.

Nelson S. Greensfelder

The end came suddenly after a short illness which quickly developed into pneumonia. He is survived by his wife, Grace Gleason Greensfelder, and seven-year-old son, Robert J., and by his parents Judge and Mrs. J. B. Greensfelder, Kirkwood, Missouri.

Mr. Greensfelder was born in St. Louis county, Missouri, March 20, 1891. He attended Colorado College and later the Colorado School of Mines, graduating in 1913 as an Engineer of Mines. He entered the employ of Hercules Powder Company as a salesman and demonstrator and upon showing ability as a writer and advertiser was transferred to the home offices in Wilmington. He became advertising manager in 1924.

Rosin Honored

Dr. J. Rosin has been elected a member of the Committee of Revision, U.S.P. XI, to take the place made vacant by the death of Edward V. Howell, late dean of the School of Pharmacy, University of North Carolina.

For many years Dr. Rosin was the chief chemist of the Powers-Weightman-Rosengarten Company He is now vice-president and chemical director of the successors of this company, Merck & Co. Inc.

Bookshelf

Structure Symbols of Organic Compounds, by Ingo W. D. Hackh, $2.50, 139 pages, published by P. Blakiston's Son & Co., Inc., Philadelphia.

An application of the recent theories of atomic structure to the study of organic compounds, with a simple notation of distinct educational value.

Modern Chemistry, by Charles E. Dull, $1.80, 776 pages, published by Henry Holt & Co., N. Y.

A textbook that stresses the cultural aspect of chemistry.

Transporting chlorine in an airplane might appear to be a rather hazardous undertaking. But when American Red Cross planes recently rushed emergency supplies to the stricken area in Nicaragua, the chlorine carried was in the safe, highly-concentrated powder form of HTH.

The disastrous earthquake which destroyed the city of Managua and its water supply system brought disease in its wake to add to the already heavy toll of lives. Chlorine for sterilizing and disinfecting was urgently needed, together with antitoxin, to avert further tragedy. An appeal sent out to Washington brought quick action.

Enlargement of trading facilities to provide for broadening the market in cottonseed oil has been announced by W. C. Rossman, secretary of the New York Produce Exchange, who has outlined plans for the inauguration of trading in prime summer yellow contract, April 15. Development of the new market follows nearly a full year of successful operation of the market in bleachable prime summer yellow contract.

COMING EVENTS

American Institute of Chemical Engineers, Swampscott, June.

American Leather Chemists' Association, Atlantic City, May 27-29.

American Association of Cereal Chemists, May 18-21 Brown Hotel, Louisville, Ky.

National Association of Purchasing Agents, Annual Convention, Toronto, Royal York Hotel, June 8-11.

American Society for Testing Materials, Chicago, June 22-26.

National Fertilizer Association, New Greenbriar, White Sulphur Springs, week of June 8.

Society of Chemical Industry, Montreal Section, Canadian Chemist's Convention, Montreal, May 27-29.

Thirteenth Exposition of the Chemical Industries, Grand Central Palace, N. Y. City, May 4-10.

National Cottonseed Products Association, May 18-20, Roosevelt Hotel, New Orleans.

Insecticide and Disinfectant Manufacturers' Association, Edgewater Beach Hotel, Chicago, June 1-3.

Miller New Swann V. P.

F. W. Miller, formerly Vice-President of Rogers Brown & Crocker Bros., Inc., has been appointed Vice-President of Swann Chemical Co., it was announced by Theo-

F. W. Miller

dore Swann, president of The Swann Corp. Mr. Miller will have charge of the Cincinnati office of the Swann Chemical Co., recently established on the 39th floor of the Carew Tower in that city.

Mr. Miller will be in direct charge of the sale of ferro-phosphorus, formerly handled by him for Rogers Brown & Crocker Bros., Inc. In addition he will handle sales in the Cincinnati territory of chemicals, abrasives and lampblacks for the several Swann subsidiaries.

Munson New U. S. I. President

Charles S. Munson has been elected president and director of U. S. Industrial Alcohol, succeeding Russell R. Brown who has also resigned as director. Glenn Haskell has been elected first vice president and G. Sykes vice president.

Mutual Directors

At a meeting of the board of directors of Mutual Chemical, George B. Warren and Thomas McClure Peters were elected to the directorate. Mr. Warren fills the vacancy caused by the death of Sumner W White and Mr. Peters succeeds his father, the late William R. Peters.

Smith Heads Drive

Carroll Dunham Smith, president of the Carroll Dunham Smith Pharmacal Co., 323 East 34th Street, has accepted the chairmanship of the chemical manufacturers' division for the 1931 annual maintenance campaign of the Salvation Army in which $528,000 will be sought for the support of the 52 permanent centers of the Army's work in Greater New York. The campaign will take place May 18th to June 1st, with Edward F. Hutton as general chairman.

Mr. Smith was chairman of this division last year and he will associate with himself in the effort other leaders in this field.

One million man-hours without a lost-time accident was the remarkable record just established by the Monsanto, Illinois plant of the Monsanto Chemical Works.

The new P & G plant at Longbeach, Cal., will be the most modern soap factory in America. It is now under construction and nearing completion. It will be in operation about August 1st.

S. L. Abbot, Jr. Co., as of April 1st, 1931, have acquired the business and agencies formerly conducted by the Chemical Department of Mailliard & Schmiedell, consisting of Industrial Chemicals, oils, naval stores, shellac, gums, waxes and solvents. The business will be maintained on the same basis, without interruption from their offices at San Francisco, Los Angeles and Portland.

Glyco products has appointed the following additional representatives: J. G. Herbst 401 VanDam Bldg. Philadelphia, Pa.; Ulrich Chem. Co. 314 Indiana Term. Whse. Bldg. Indianapolis, Ind.; Fred H. Palmer Jr. 850 Euclid Ave., Cleveland, Ohio; Dr. J. W. Denton, 1079 Monroe Ave., Memphis, Tenn.

Nichols Copper has entered into a deal with the Canadian interest, the Sulphide Research Corp., Ltd., whereby ore roasting processes and developments of both are merged under a new company.

The new enterprise is known as the Nichols Engineering & Research Corporation, located at 40 Wall Street, New York, and is headed by C. W. Nichols, chairman of the executive committee of Allied Chemical.

Lewin-Mathes Co.,a holding corporation with total assets of $4,000,000, was organized as a result of the consolidation of the General Metals Refining Co., St. Louis, and Lewin Metals Corporation of Monsanto, Ill. It owns this consolidated company outright, together with the G. Mathes Co., St. Louis.

New Jersey Zinc has filed suit in the United States District Court of New York against James A. Singmaster and Tubize Chatillon Corp. to compel an assignment of a patent issued August 20, 1929, to Mr. Singmaster for an improvement in artificial silk filaments.

Paper Makers Chemical, has acquired the business and chemical manufacturing properties of the Georgia-Louisiana Corp., Atlanta, Ga., and Marrero, La. Operations will be carried on under the name of the Paper Makers Chemical Corp.

Belgian Trading Co. has moved to larger quarters at 16-20 E 12 St., N. Y.

Semet-Solvay Engineering Corp., has acquired patents and manufacturing rights

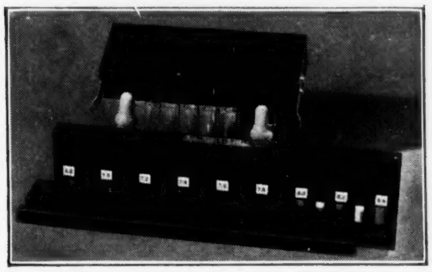
News of the Companies

relating to the Koller gas producer and the Koller mechanical grate, together with the industrial gas equipment formerly manufactured and sold by the Gas Research Co. and the Smith Gas Engineering Co., of Dayton, Ohio.

Van Dyk & Co., Inc., announce their removal from 4 and 6 Platt Street, to their new offices 50 West 17th Street, New York.

E. C. Klipstein & Co., has joined the procession of chemical companies to the Empire State Building in New York.

Phosphate Export Association and Florida Pebble Phosphate Export Association announce the removal of their New York office to 393 Seventh Avenue, New York City.



The Slide Comparator, the latest in pH control. W. A. Taylor & Co., of Baltimore, is the manufacturer. Molded from Bakelite, it combines durability, precision, convenience and simplicity

A. Gross & Co., is now at the Chanin Building, 122 E 42 St., N. Y. City.

Baird & McGuire have appointed The Eastern States and Supply Co., of 136 Liberty St., N. Y. City as manufacturers' agents for the sale of the company's products in the Metropolitan Section.

Proctor & Gamble Co. has completed negotiations for the purchase of the Portsmouth Cotton Oil & Refining Corp. of Portsmouth, Va. The Portsmouth company reported sales of around $10,000,000 last year. The bulk of its business has been in the hotel and institutional field.

The Eagle Picher Lead Co. has entered suit against Canam Metals Corp. in the Circuit Court at Joplin, Mo., charging default in payments on $450,000 promissory note of which $421,566 is alleged to remain unpaid. Attorney for Eagle Picher has asked for a court order to foreclose on defendants' property in the tri-state field. Canam Metal Corp. is a subsidiary of Canam Metals, Ltd., of Duluth, Minn.

Asbestos Limited of Millington, N. J., is to be investigated together with the Amtorg Trading Company, Soviet agency in this country, by the Federal Tariff Commission on charges of dumping asbestos fiber on the American market.

The Millington company was named co-defendant with the Amtorg company in complaints filed by the Bear Canyon Asbestos Company and the Regal Asbestos Mines, United States concerns.

The Carbide & Chemicals Corp. has awarded a contract for the erection of a 9,900-barrel chemical storage plant, 28 by 50 feet in size, adjoining its plant in Niagara Falls.

Plans have been developed by the Owens-Illinois Glass Co. for the construction of a bottle factory in the San Francisco Bay district.

Allied Chemical & Tar Corp., Elizabeth, N. J., is contemplating construction of a new plant.

Cuban-American Manganese Corp., recently purchased by the Freeport Texas Co., has announced plans for the construction of the first unit at Santiago, Cuba.

Equipment Companies

Sholes Inc., have developed a method of welding fine silver without the use of any other metals. These welds are possible on very light as well as heavy gauges and do not materially change the character or structure of the silver. Furthermore, after these welds are hammered off and polished it is very difficult, if possible, to locate them.

An agreement between the U. S. Steel and Fried. Krupp A. G. of Germany for the licensing by Krupp of subsidiaries of the Steel Corporation under patents of Strauss, Johnson, Armstrong, Fry, Kuehn and Smith for rust-resisting, heat-resisting and other alloy steels and for their heat treatment was announced on April 17.

The arrangement, which includes the collaboration of Krupp in the technical work on corrosion-resisting and heat-resisting steels and the like, will apply to the products of the Illinois Steel, Carnegie Steel, American Steel and Wire, American Sheet and Tin Plate, National Tube and Lorain Steel Company.

Chicago Chemist Building

Adoption of the 42-story Steuben Building at the northeast corner of Randolph and Wells streets into a center for the chemical interests of Chicago and the Middle West, is now under consideration by the Chicago Chemical Society and the Chicago Chemists' Club.

The Financial Markets

Final Act in Formation of "Cosach" Completed—Vanadium Passes Dividend—du Pont Earns $1.01 in First Quarter—Colgate Floats New Preferred Issue.

Stockholders of the Anglo-Chilean Consolidated Nitrate Corporation and the Lautaro Nitrate Corporation formally approved the adherence of these companies to the Chilean Government's plan for consolidation of the Chilean nitrate industry into a single company Compania de Salitre de Chile, or Cosach on April 17.

Ratification of the plan was the second important step in the last month in the formation of Cosach, which will have total assets of more than $750,000,000. The first step was the offering several weeks ago of $15,000,000 of Cosach's bonds in London and other European centres as part of an international loan of $50,456,-500.

Consolidation Benefits

Silas W. Howland, first vice president of the Anglo-Chilean and Lautaro companies, issued a statement, as follows:

"Approval of the plan by these two companies doubtless will be followed soon by approval of stockholders of the other companies which have signified their intention of joining the consolidation. It is expected that by July 1 virtually the entire Chilean nitrate industry will have joined Cosach, thus fusing thirty-six companies that heretofore had operated independently of one another.

"Adherence of Anglo-Chilean and Lautaro to Cosach makes available to the industry the two large-scale modern plants constructed for use of the Guggenheim process—Maria Elena, now in operation, and Pedro de Valdivia, where operations are just commencing. Ownership of the patents covering the Guggenheim process passes to Cosach, thus opening the way to construction of new large-scale plans.

"The two Guggenheim-process plants have a total rated capacity of 1,350,000 metric tons per annum. Not only is the cost of production in these plants substantially below that of plants utilizing the old (Shanks) process, but the grained nitrate produced is a distinctly superior product. Moreover, the ability to treat low-grade nitrate ores by the Guggenheim process and the higher percentage of extraction reached result in doubling the amount of nitrate recoverable.

Export Tax Removed

"Pursuant to the special law providing for consolidation of the industry, the Chilean Government has agreed that all nitrate and iodine exported by Cosach and its subsidiaries will be exempt from the export duties heretofore in force, and has also made available to Cosach, without cost, government-owned nitrate deposits up to 150,000,000 metric tons of recoverable nitrate. For these concessions the government has received half the shares of Cosach, and to it has been guaranteed for 1931, 1932 and 1933, respectively, $21,-900,000, $19,500,000 and $17,100,000. Payments for 1932 and 1933 may be made in Cosach bonds of a principal amount equal to 110 per cent of the amounts guaranteed, which probably will be done. The 1931 guarantee is payable in cash and provision for raising the needed funds has been made through recent financing After 1933 the government will look to the income from its Cosach shares as its sole revenue from the nitrate industry, except for an income tax not to exceed 6 per cent per annum.

"The export tax on Chilean nitrate has been in force for more than fifty years, and except for unimportant concessions of a temporary character has stood at the rate of $12.32 a metric ton. For the last four years the tax has averaged more than $25,000,000 per annum.

"During the last twenty years exports have averaged 2,269,080 tons, and during the last five nitrate years 2,365,352 tons. Of the latter tonnage the nitrate concerns which have indicated their intention of adhering to Cosach have exported approximately 93.5 per cent.

"Under the plan the funded debt of Anglo-Chilean Consolidated Nitrate Corporation and the funded debt and preference shares of Lautaro Nitrate Company, Ltd., remain outstanding and both companies will remain separate corporations, owning the plants and other property which they now have.

"These companies will be relieved from the payment of the $12.30 export tax and instead they will pay a maximum charge of $7.30 a ton of nitrate exported. The sales quota restrictions will disappear. The two plants that are the lowest cost producers will undoubtedly be operated at capacity—600,000 tonsfor Anglo-Chilean's Maria Elena plant and 750,000 tons for Lautaro's Pedro de Valdivia plant.

"The position of the Anglo-Chilean bonds and of the Lautaro bonds and preference shares will be much improved. Each company will have the benefit of earnings based on full operation of its plant, and the elimination of at least $5 a ton of charges prior to the bonds will mean an annual increase of income available for service of these securities of at least $3,000,000 for Anglo-Chilean bonds and $3,750,000 for Lautaro bonds and preference shares. If Cosach exports more than 1,600,000 tons per annum, the earnings will be increased. Lautaro's Pedro de Valdivia plant will reach its full capacity probably about Jan. 1, 1932."

THE WRONG TRAIL OUT, BUT A LOT OF FUN

Vanadium Corp. of America has omitted the quarterly dividend of 75 cents due at this time.

Following statement was issued:

"Although Vanadium Corp. of America made a profit of approximately $150,000 for the first quarter and has a substantial earned surplus, the board of directors owing to depressed business conditions prevailing during 1930 and continuing through the first quarter of 1931, and the further fact that considerable sums have been and are being expended for development, improvements, and expensions, voted to pass the dividend which otherwise would have been payable May 15."

Exchange Listings

New York Stock Exchange has voted to list 7,500 additional shares of Foster-Wheeler Corp. common stock, making total now listed $292,250 shares. The 7,500 shares were issued for part of consideration given in payment of the assets of the D. Connelly Boiler Co. of Cleveland, Ohio.

Directors of Monroe Chemical Co. were reelected at the annual meeting held April 1.

du Pont Statement

E. I. du Pont de Nemours & Company reports earnings in first quarter of 1931 sufficient to cover all dividend requirements. Earnings applicable to the common stock were $11,163,934, or $1.01 a share on the average number of 11,065,762 shares outstanding. These earnings include dividends from General Motors investment amounting to $0.68 a share on du Pont common. In first quarter of last year earnings were $1.52 a share on the average number of 10,463,693 shares outstanding, which included dividends from General Motors investment of $1.00 on du Pont common. Therefore the earnings on common for current quarter, exclusive of income from General Motors investment, were $0.33 a share as gainst $0.52 a share for same period last year.

Net Income for the quarter was $12,656,929 as against $17,347,626 for corresponding period last year. These figures include $7,484,000 income from General Motors Investment as against $10,481,065, including $2,993,600 extra dividend, for same period last year.

Income from operations for first quarter this year was $4,270,579 as against $6,748,281 for same period last year, and Income from Miscellaneous and Marketable Securities was $1,232,504 for current quarter as compared with $1,008,782.

Surplus Account at March 31, 1931, amounts to $208,186,635, as compared with $208,082,665 at December 31, 1930.

E. I. DU PONT DE NEMOURS & COMPANY
STATEMENT OF CONSOLIDATED INCOME AND SURPLUS

Income Account

	Three Months Ended March 31st 1931	1930
Income from Operations	$ 4,270,579	$ 6,748,281
Income from Investment in General Motors Corporation	7,484,000	10,481,065(a)
Income from Miscellaneous and Marketable Securities, etc	1,232,504	1,008,782
Total Income	$12,987,083	$18,238,128
Provision for Federal Income Tax	312,017	872,290
Net Income before Interest on Bonds	$12,675,066	$17,365,838
Interest on Bonds of Subsidiary Companies	18,137	18,212
Net Income	$12,656,929	$17,347,626
Dividends on Debenture Stock	1,492,995	1,492,979
Amount Earned on Common Stock	$11,163,934	$15,854,647
Average number of shares of $20.00 par value common stock outstanding during the period	11,065,762	10,463,693
Amount earned a share	$1.01	$1.52

Dividends

Archer-Daniels-Midland Co. has omitted the quarterly dividend of 50 cents on the common stock due at this time. The regular quarterly dividend of $1.75 on the preferred was declared, payable May 1 to stock of record April 20.

Barnsdall Corp. declared dividends of 25 cents each on the class A and class B common stocks, payable May 11 to stock of record April 14. Three months ago, similar payments were made.

Directors of the United States Industrial Alcohol Company at their meeting April 2 placed the common stock on a $2 annual dividend basis with the declaration of a 50-cent distribution payable May 1 to stock of record April 15. The previous dividend was at the rate of $6 per share per annum.

Cerro De Pasco Copper Corp. declared a quarterly dividend of 37½ cents, payable May 1 to stock of record April 16. This places the stock on a $1.50 annual basis. Three months ago the dividend rate was reduced to $2 annually from $4.

American Smelting & Refining Co. has declared regular quarterly dividend of $1 a share on the common, $1.75 a share on the preferred and $1.50 a share on the special preferred stock.

Common dividend is payable May 1, to stock of record April 17 and both preferred dividends June 1 to stock of record May 8.

St. Joseph Lead Co. has declared three quarterly dividends of 25 cents each, placing the stock on a $1 annual basis against $2 previously. Dividends are payable June 20, September 21, and December 21, to stock of record June 9, September 10 and December 10, respectively.

At the annual meeting of Certain-teed Products Corp., in addition to reelecting retiring directors, stockholders approved the recommendation of the board to reduce the declared value of the common stock to $15 a share. At the time of the issuance of balance sheet, as of December 31, last, the outstanding 382,300 shares of common stock were valued at $16,601,377, or $43.42 a share.

The reason for the revision in the declared value of the common stock was to eliminate a profit and loss deficit of $9,153,213 resulting from the writing down of plants by $7,184,330 and an operating loss for 1930 of $2,468,319.

St. Joe New Issue

Stockholders of the St. Joseph Lead Company approved April 9, a new issue of $10,000,000 convertible bonds bearing 5½ per cent interest and maturing in ten years. The bonds will be offered at 97½ to stockholders of record of April 20 in the ratio of $100 par value of bonds for each twenty shares held.

The bonds will be convertible into stock at 33 1-3 a share and will be redeemable on any interest date up to May 1, 1940, in whole but not in part, at 105 and interest, and thereafter at 100 and interest. The issue has been underwritten by J. P. Morgan & Co.

Colgate Pfd. Floated

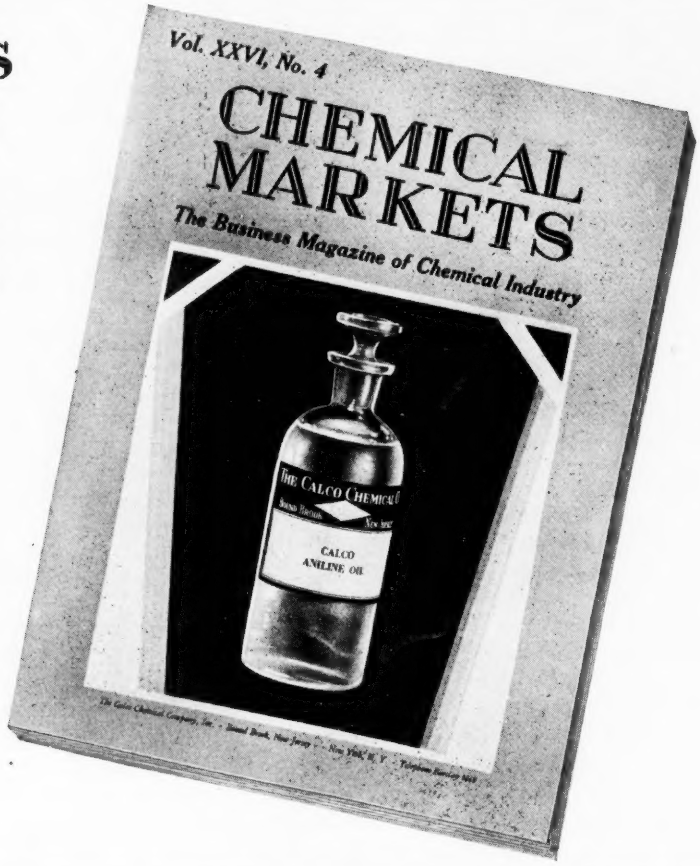
An issue of $8,000,000 Colgate-Palmolive-Peet Company 6 per cent cumulative preferred stock was offered April 9, at $101.75 flat by a group headed by the Guaranty Trust Company and including the Continental Illinois Company, Goldman, Sachs & Co. and Field, Glore & Co. The proceeds will be used to reimburse the company for expenditures previously made in connection with the acquisition of additional properties and for other corporate purposes. The company is successor to Colgate & Co., the Palmolive Company and Peet Brothers Company. It distributes soap products in forty-eight countries.

At the meeting of Stockholders, held April 8th, the stockholders, under recent amendment of the Link-Belt Company charter, elected three additional members to the Board of Directors, thus increasing the Board to twelve. No changes were made in the old Directorate of nine. The new members are: Arthur L. Livermore, Attorney, New York City; George P. Torrence, Vice-President of the Company in charge of the Indianapolis plant.

The 1929 6% convertible I. G. Farbenindustrie A. G. bonds have been listed on the Amsterdam Stock Exchange. Bankers for the issue state that 1930 dividend will be at least 10%, while it is understood here that dividend probably will be 21% against 12% plus 2% bonus last year.

CHEMICAL MARKETS

SHOULD BE ON YOUR DESK EVERY MONTH



IN these days of constantly changing economic conditions in the chemical business, it is imperative that you key men in the chemical producing and chemical consuming industries be well informed and constantly in touch with the latest developments in the industry. ¶In no other line of business are changes so sudden, drastic or revolutionary: a product or a process may be efficient and useful today and obsolete and useless tomorrow. ¶You must keep pace with these rapidly changing conditions or fall by the wayside. ¶It is the function of this publication to bring to you every month the facts you need to know, the information that is essential to your progress and prosperity. You can make no better investment than a subscription to CHEMICAL MARKETS.

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For Executives who manufacture, process, buy, sell or use chemicals

Company Reports

United Dyewood Earnings Higher

United Dyewood Corp. and subsidiaries for year ended December 31, 1930, shows consolidated net income of $209,482 after depreciation, federal taxes, general reserves and other charges, equivalent after subsidiary dividends, to $5.06 a share on 38,700 shares of 7% preferred stock of United Dyewood Corp. This compares with $461,132 or $1.17 a share on 139,183 shares of common stock in 1929, after dividends on the preferred shares.

Consolidated income account for year 1930 compares as follows:

	1929	*1929*	*1928*
Operating profit	$575,985	$834,015	$932,802
Other income	13,774	31,323	51,339
Total income	$589,759	$865,338	$984,141
Depreciation	138,243	150,829	121,773
Federal taxes	73,366	83,816	125,110
Miscella deductions	62,769	49,561	44,758
General reserve	19,575	22,644	28,363
Other appropriations	86,324	97,356	114,414
Net income	$209,482	$461,132	$549,723
Subsid dividends	13,596	21,116	19,903
7% pfd divs	275,112	276,500	276,500
Deficit	$79,226	*$163,516	*$253,320

*Surplus.

Callahan Zinc Shows Loss

Callahan Zinc-Lead Co. for year ended December 31, 1930, shows loss of $65,910 after expenses, etc., but before depreciation and depletion, comparing with loss of $57,770 in 1929.

Current assets on December 31, last, were $245,138 and current liabilities $6,737 as contrasted with $312,390 and $11,728 respectively, at end of preceding year.

Income account for year 1930 compares as follows:

	1930	*1929*	*1928*	*1927*
Total income	$50,636	$98,799	$118,499	$340,881
Costs exp etc	131,367	174,895	273,715	298,762
Oper loss	$80,731	$76,096	$85,216	*$42,119
Other income	14,821	18,326	27,663	28,060
†Loss	$65,910	$57,770	$57,553	*$70,179

*Profit. †Before depreciation and depletion.

Wood Chemical Products Co. reports for year ended December 31, 1930, net loss of $101,375 after all charges, including depreciation, and after inventory write-down of $46,101, compared with net profit of $116,182 in 1929.

Current assets amounted to $221,108, against current liabilities of $91,945.

Carman & Co., Inc., and subsidiaries for year ended December 31, 1930, shows consolidated net profit of $218,838 after interest, federal taxes, etc. After allowing for dividend requirements on 38,779 no par shares of $2 Class A stock outstanding at close of the year, the balance available for sinking fund requirements and Class B stock, was equivalent to $1.84 a share on 76,781 no-par shares of Class B stock. This compares with $310,388, or $3.12 a share, on 72,500 shares of Class B stock at end of 1929.

Industrial Rayon Corp. reports for quarter ended March 31, 1931, net profit of $13,364 after depreciation, interest and federal taxes, equivalent to six cents a share on 200,000 no-par shares of capital stock. This compares with $359,439 or $1.79 a share on 199,923 shares in first quarter of 1930.

Carrier Corp. and subsidiaries report for six months ended December 31, 1930, consolidated net profit of $51,889 after interest, depreciation and federal taxes. Current assets as of December 31, 1930, were $4,410,064 and current liabilities $885,323.

Eastman 1930 Net High

Eastman Kodak Co. of New Jersey and subsidiaries for year ended December 27,1930, shows net profit of $20,353,788 after depreciation and federal taxes, equivalent after 6% preferred dividends, to $8.84 a share on 2,261,030 no-par shares of common stock outstanding at end of year. This compares with net profit in 1929 of $22,004,915 equal to $10.26 a share on average number of common shares outstanding during that year and $9.56 a share on 2,261,320 common shares outstanding at end of year.

Consolidated statement for year ended December 27, 1930, compares as follows:

	Year ended Dec. 27, '30	*Year ended Dec. 28, '29*	*Year ended Dec. 29, '28*	*Year ended Dec. 31, '27*
Operat. profit	$24,073,525	....	....	....
Other income	3,977,938	....	....	....
Total inc	$28,051,463	....	....	....
Deprec	4,874,326	....	....	....
Oth chgs (net)	190,927	....	....	....
Fed & for tax	2,632,422	....	....	....
Net profit	$20,353,788	*22,004,915	*20,110,440	*20,142,161
Pfd divs	369,942	369,942	369,942	369,942
†Com divs	18,088,980	16,858,112	16,452,300	16,436,800
Surplus	$1,894,866	$4,776,661	$3,288,198	$3,335,419
P & L surp	84,675,404	82,780,537	77,993,675	74,705,477

*After depreciation and federal taxes. †Includes $227,600 reserve for dividends on common stocks in litigation.

Sun Oil Co. and subsidiaries report for year ended December 31, 1930, shows net profit of $7,745,484 after interest, depreciation, depletion, federal taxes and deduction of $1,387,232 for inventory adjustments, equivalent after dividend requirements on the 6% preferred stock to $5.10 a share on 1,409,247 no-par shares of common stock which were outstanding prior to payment on December 15 of a 9% stock dividend. This compares with net profit of $8,242,491 or $5.60 a share on 1,417,292 common shares in 1929.

The inventory write-down was made because of reduction in crude prices during the last quarter bringing all inventories as of December 31, 1930 to cost or market whichever was the lower.

Consolidated income account of Sun Oil Co. and subsidiaries for year 1930 compares as follows:

	1930	*1929*	*1928*
Gross	$98,333,616	$86,007,947	$64,288,288
Cost and expenses	77,482,000	67,441,826	55,371,113
Balance	$20,851,616	$18,566,121	$8,917,175
Other income	391,587	515,380	179,136
Total income	$21,243,203	$19,081,501	$9,096,311
Interest	745,684	695,312	538,909
Intang dev costs	2,992,375	3,131,580	....
Deprec. and depletion	6,676,908	5,465,875	3,097,544
Federal taxes	1,695,520	1,546,243	451,831
Inventory adj	1,387,232	....	....
Net profit	$7,745,484	$8,242,491	$5,008 027

Aluminum Co. of America and subsidiary companies for year ended December 31 shows profit of $11,672,726 after depreciation, depletion, federal taxes, etc., but before adjustments, equivalent after 6% preferred dividends to $1.92 a share on 1,472,625 no-par shares of common stock. After deduction of $804,041 for uncollectible accounts, net loss from sale or retirement of capital assets and other sundry adjustments not acecting the year's operations, net income was $10,868,685, or $1.38 a common share. This compares with profit of $25,318,050 after depreciation, depletion, federal taxes, etc., but before adjustments, equal after preferred dividend requirements, to $11.18 a common share in 1929. After deduction of $1,189,541 for uncollectible accounts, net loss from sale or retirement of capital assets and other sundry adjustments not affecting the year's operations, net profit for 1929 was $24,128,509, or $10.37 a common share.

Report of Corn Products Refining Co. for year ended December 31, 1930, shows net income of $14,067,689 after interest, depreciation, federal taxes, etc., equivalent, after preferred dividends, to $4.86 a share (par $25) on 2,530,000 shares of common stock. This compares with $16,309,651 or $5.75 a common share in 1929.

Texas Gulf First Quarter Lower

Texas Gulf Sulphur Co., Inc., reports for quarter ended March 31, 1931, net income of $2,448,198 after depreciation and federal taxes, but before depletion, equivalent to 96 cents a share on 2,540,000 no-par shares of stock. This compares with $3,803,701 or $1.50 a share in first quarter of 1930.

During first quarter of 1931, company decreased its reserves, including reserves for depreciation and federal taxes, by $3,713, making total of these reserves $13,659,884 on March 31, last.

Statement for quarter ended March 31, 1931, compares as follows:

	1931	*1930*	*1929*	*1928*
*Net income	$2,448,198	$3,803,701	$3,880,260	‡3,087,839
Dividends	2,540,000	2,540,000	2,540,000	2,540,000
Deficit	$91,802	‡$1,263,701	‡$1,340,260	‡$547,839
†P & L surp	25,108,843	22,652,261	16,641,343	11,491,302

*After depreciation and federal taxes. †Includes reserve for depletion. ‡Surplus.

Koppers 1930 Net $2.40

Koppers Gas & Coke Co. and subsidiaries for year ended December 31, 1930, report consolidated net profit of $3,140,113 after depreciation, interest, federal taxes, etc., equivalent after allowing for dividend requirements on 6% preferred stock, to $2.40 a share on 807,091 no-par shares of common stock. This compares with $6,600,066 or $6.69 a share on common in 1929.

Consolidated income account for year 1930, compares as follows:

	1930	*1929*	*1928*
Net from oper	$4,430,785	....	....
Other income	4,737,074	....	....
Gross income	$9,167,860	$11,078,853	$6,441,656
Depreciation	1,134,560	854,781	519,776
Federal taxes	446,568	779,710	673,157
Interest	3,315,276	1,881,256	1,341,261
Other deductions	1,131,343	963,040	111,588
Net profit	$3,140,113	$6,600,066	$3,795,874
Pfd divs	1,200,000	1,200,000	1,800,000
Surplus	$1,940,113	$5,400,066	$1,995,874

McKesson & Robbins, Inc., for year ended December 31, 1930, including results of operation of companies prior to acquisition, shows net profit of $2,629,196 after depreciation, interest, federal taxes, etc., equivalent after preferred dividends and minority interest of McKesson & Robbins, Ltd., and 7% preference dividends of McKesson & Robbins, Inc., to 96 cents a share on 1,074,721 shares of no-par common stock outstanding at end of year. This compares with $4,109,872 or $2.65 a share on 1,016,698 common shares in 1929.

American Maize-Products Co. for year ended December 31, 1930, shows net profit of $1,023,790 after depreciation, federal taxes, etc., equivalent, after dividends of $105,000 paid on 7% preferred stock, to $3.06 a share on 300,000 no-par shares of common stock. This compares with $1,548,440 or $4.81 a common share in 1929.

Current assets including materials and supplies on December 31, 1930, were $3,576,908 and current liabilities $307,313 comparing with $3,700,853 and $355,112, respectively, at close of 1929.

Archer-Daniels-Midland Co. reports for six months ended February 28, 1931, net profit of $457,820 after depreciation, federal taxes, etc., equivalent after dividend requirements on 7% preferred stock, to 59 cents a share on 549,546 no-par shares of common stock. This compares with $806,160 or $1.22 a share on common for the six months ended March 1, 1930.

For quarter ended February 28, 1931, net profit was $104,229 after charges and federal taxes, equal to seven cents a share on common, comparing with $353,591 or 52 cents a share on common in preceding quarter and $347,995 or 51 cents a common share in second quarter of previous fiscal year.

I. C. I. Annual Statement

London—Imperial Chemical Industries, Ltd., for year ended December 31, 1930, shows net profit of $4,473,392 after reserve for obsolescence and provision for income tax, equivalent after dividends paid on preference and ordinary stocks, to 2.79% on £10,868,259 (par 10s) deferred stock. This compares with £5,251,188 after general reserve, obsolescence and income tax in 1929, or 4.23% on £10,867,437 deferred stock.

Income account of Imperial Industries, Ltd., for year ended December 31, 1930, compares as follows:

	1930	*1929*
Gross profit	£5,129,757	£6,502,340
General reserve	....	529,020
Res for obsolescence	500,000	575,478
Prov. for income tax	156,365	146,654
Net profit	£4,473,392	£5,251,188
*Bal. from prev. year	349,926	108,807
Total	£4,823,318	£5,359,995
Preference divs	1,554,554	1,407,755
Ordinary divs	2,615,281	3,383,964
Divs. on deferred stock	....	217,353
Balance carried forward	£653,483	£350,923

*Less dividends paid in respect of further shares exchanged since date of last balance sheet.

Johns-Manville Quarter Unfavorable

Johns-Manville Corp. and subsidiaries report for quarter ended March 31, 1931, net profit of $230,109 after expenses, federal taxes, etc., equivalent after dividend requirements on 7% preferred stock, to 13 cents a share on 750,000 no-par shares of common stock. This compares with $741,630, or 81 cents a share in first quarter of 1930.

Consolidated income account for quarter ended March 31, 1931, compares as follows:

	1931	*1930*	*1929*	*1928*
Sales	$7,811,486	$12,164,662	$13,023,884	$10,038,574
Costs & exp	7,563,103	11,320,964	11,785,230	9,158,951
Balance	$248,383	$843,698	$1,238,654	$879,623
Fed taxes	18,274	102,068	132,565	106,918
Net profit	$230,109	$741,630	$1,106,089	$772,705

Abbott Laboratories for quarter ended March 31, 1931, was approximately $195,000 after depreciation, amortization, etc., but before federal taxes. Capital stock amounts to 145,000 no-par shares.

Owens-Illinois Glass Co. and subsidiaries for year ended December 31, 1930, shows net profit of $2,738,540 after depreciation, federal taxes and other charges, equivalent after dividends paid on 6% preferred stock, to $2.45 a share on 922,173 shares (par $25) of common stock, outstanding at end of year. This compares with $4,451,826, or $4.80 a share on 827,226 common shares in 1929.

Earnings at a Glance

Company	*Annual Dividend*	*Net Income 1930*	*Net Income 1929*	*Common Share Earnings 1930*	*Common Share Earnings 1929*
Aluminum, Ltd. Year, Dec. 31..	f	$968,567	$2,379,020	h$1.29	h$4.15
Aluminum Co. of.	f	10,868,685	24,128,509	1.38	10.37
Aluminum Co. of America: Year, Dec. 31..	f	10,868,685	24,128,509	1.38	10.37
Callahan Zinc-Lead Year, Dec. 31..	f	e65,910	e57,770	....	....
Cleveland-Cliffs Iron Co.: Year, Dec. 31..	1.00	4,886,150	6,046,105	h5.14	h12.05
Johns-Manville Mar. 31 quarter	3.00	230,109	741,630	.13	.81
McKesson & Robbins, Inc. Year, Dec. 31..	1.00	2,629,196	4,109,872	h.96	h2.65
Tennessee Corp. Year, Dec. 31..	.50	1,034,907	1,877,431	1.20	2.19

fNo Dividend. hApproximated.

The Industry's Stocks

NEW YORK STOCK EXCHANGE

1931 April High	1931 April Low	1931 April Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
95½	77⅜	83½	109⅜	77⅜	156⅞	87½	201,200	651,400	Air Reduction	No	830,000	$3.00	6.32	7.75
143½	116¼	124½	182¾	116¼	343	170¼	246,985	986,685	Allied Chem. & Dye	No	2,401,000	6.00		12.60
126	124	124½	126	120¾	126¼	120¾	1,000	5,600	7% cum. pfd.	100	393,000	7.00		76.88
22	14¼	15	29¾	14¼	10⅝	1⅝	11,500	32,200	Amer. Agric. Chem.	100	333,000		Yr. Je. '30 Nil	
9⅛	5⅞	6¼	14½	5⅞	33	9	20,700	108,000	Amer. Com. Alc.	No	389,000		—	3.22
19⅞	14⅞	16	23¾	14⅞	51½	7	5,200	47,600	Amer. Metal Co., Ltd.	No	1,218,000	1.00		3.23
...	...	...	...	...	116	80	...	600	conv. 6% cum. pfd.	100	68,000	6.00		47.53
48⅞	39	40½	58½	39	79½	37½	67,450	399,495	Amer. Smelt. & Refin.	No	1,830,000	4.00		10.02
138½	133	133	138½	129	141	131	1,300	4,500	7% cum. pfd.	100	500,000	7.00		43.66
2¾	1⅞	2¼	4½	1⅞	22½	2	7,000	26,600	Amer. Solvents & Chem.	No	503,000			2.56
6	4½	4¾	8¾	4½	17⅞	3⅝	7,900	56,000	Amer. Zinc. Lead, & Smelt	25	200,000			0.53
35⅛	35	35	39¾	26¾	79⅞	26¾	1,500	6,100	6% cum. pfd.	25	80,000			7.32
35	27⅛	30½	43½	27⅛	81½	25	331,000	1,957,525	Anaconda Copper Mining	50	8,859,000	2.50		8.29
14¾	10	11¾	17⅞	10	29¼	13⅛	17,800	55,500	Archer Dan. Midland	No	550,000	2.00	Yr. Aug. '30 1.68	
19¼	12½	15¼	23⅝	12½	51⅝	16⅝	123,600	426,000	Atlantic Refining Co.	25	2,690,000	1.00	1.02	6.20
42½	34	35	54	34	106	42	8,400	21,100	Atlas Powder Co.	No	265,000	4.00	2.67	7.66
98½	94½	96	99⅞	94½	106	97	500	1,310	6% cum. pfd.	100	96,000	6.00		28.25
1⅞	1	1	2	⅞	5¼	⅞	1,900	12,400	Butte & Sup. Mining	10	290,000			Nil
1⅞	1½	1½	2	1½	4¼	1¼	4,300	19,900	Butte Copper & Zinc	5	600,000			0.34
6⅛	3½	4	7¼	2¼	15⅞	2	8,100	48,100	Certain-Teed Products	No	400,000			Nil
24½	20	20	25⅛	8¼	45⅛	6¾	400	2,739	7% cum. pfd.	100	63,000			Nil
47¾	43½	43¾	50½	43½	64⅞	44	8,100	48,100	Colgate-Palmolive-Peet	No	2,000,000	2.50	3.76	4.03
84¾	65¼	72¼	111⅝	65¼	199	65⅛	77,200	278,320	Columbian Carbon	No	499,000	5.00		7.84
17¾	12¼	13¾	21½	12¼	38	14	201,600	1,131,800	Comm. Solvents	No	2,530,000	1.00	1.07	1.51
81	62½	67¼	86⅝	62½	111⅝	65	87,400	263,900	Corn Products	25	2,530,000	3.00		5.49
151½	151⅝	151⅝	152	146⅞	151½	140	470	2,140	7% cum. pfd.	100	250,000	7.00		62.59
17¼	11½	13¼	23	11½	43⅝	10	15,100	188,300	Davison Chem. Co.	No	504,000		Yr. Je. '30 4.00	
17¼	13¾	13¾	19⅛	13	42¾	11½	1,700	11,300	Devoe & Raynolds "A"	No	160,000	1.20	2.24	4.52
103½	102½	103½	109	102½	114¾	99	40	180	7% cum. 1st pfd.	100	16,000	7.00		67.59
97⅜	77⅜	83	107	77⅜	145¼	80½	502,400	1,295,000	DuPont de Nemours	20	11,014,000	4.00	4.64	6.99
124	121½	122	124	118¾	123	114½	2,100	11,500	6% cum. deb.	100	978,000	6.00		78.54
165	147	155½	185¾	143⅜	255¼	142⅛	172,100	537,005	Eastman Kodak	No	2,261,000	5.00		9.57
134¼	133¾	133¾	134¼	128¾	134	120⅞	80	850	6% cum. pfd.	100	62,000	6.00		356.89
39	27¾	30¼	43¼	27¾	55½	24⅛	123,900	528,900	Freeport Texas Co.	No	730,000	4.00		5.60
33	20⅞	22¼	47	20⅞	71⅛	22⅜	71,000	312,700	General Asphalt Co.	No	413,000	3.00		4.71
11⅝	8⅝	8⅞	16⅛	8⅝	38	7	16,271	130,771	Glidden Co.	No	695,000		Yr. Oct. '30 Nil	
60	59⅞	59⅞	78	59⅞	105½	63½	270	2,250	7% cum. prior pref.	100	74,000	7.00	Yr. Oct. '30 Nil	
50½	44	44	58	44	85	50	3,000	5,600	Hercules Powder Co.	No	603,000	3.00	2.91	5.95
119¼	118	118	119½	117	123¾	116½	310	1,210	7% cum. pfd.	100	114,000	7.00		38.16
75	28½	34	86	28½	124	31	53,000	215,500	Industrial Rayon	No	200,000	4.00		7.26
3½	2¾	2¾	5¼	2¾	8½	3⅜	3,300	25,000	Intern. Agric.	No	450,000		Yr. Je. '30 1.68	
36	35	35	51¼	35	67¼	42¼	800	5,500	7% cum. prior pfd.	100	100,000	7.00	Yr. Je. '30 14.58	
18⅛	14⅛	15⅛	20⅛	13⅞	44⅝	12¾	406,900	2,641,100	Intern. Nickel	No	14,584,000	1.00		1.47
36⅝	39¾	32⅜	42	29¾	45¾	31	16,000	306,900	Intern. Salt	No	240,000	3.00		11.32
70	43⅞	48½	80¾	43⅞	148⅜	48¾	365,800	1,128,400	Johns-Manville Corp.	No	750,000	3.00		8.09
15⅛	13	13	16½	10	25	8¾	2,000	9,200	Kellogg (Spencer)	No	598,000	0.80		2.36
44	29½	31	55⅛	29½	81⅞	39	22,100	120,200	Liquid Carbonic Corp.	No	342,000	4.00	Yr. Sep. '30 5.22	
13½	11⅛	12	17	11⅛	37⅜	10½	15,200	95,500	McKesson & Robbins	No	1,073,000	1.00		2.65
33	29⅛	30⅝	37¼	29⅛	49¼	25¾	3,900	17,600	conv. 7% cum. pref.	50	428,180	3.50		9.43
21⅜	17	17½	25	17	39⅜	20	2,100	6,800	MacAndrews & Forbes	No	340,000	2.60		3.13
25½	18⅜	20½	31½	18⅜	51⅝	30¼	33,700	312,665	Mathieson Alkali	No	650,000	2.00	2.96	3.31
...	...	...	125⅜	119	136	115	...	360	7% cum. pfd.	100	28,000	7.00		93.91
24	18½	22⅞	26½	18½	63¾	18⅜	4,800	26,000	Monsanto Chem.	No	416,000	1.25	1.80	4.25
34	24⅜	27	36⅜	19¾	39½	18⅛	48,500	225,900	National Dist. Prod.	No	252,000	2.00		1.42
121¾	112¼	113	132	112¼	189½	114	9,800	19,000	National Lead	100	310,000	5.00		25.49
141	140⅛	140⅛	141	135⅝	144	135	380	2,220	7% cum. "A" pfd.	100	244,000	7.00		41.95
119	118⅛	118⅛	119⅞	118	120	116	280	2,300	6% cum. "B" pfd.	100	103,000	6.00		82.47
48½	47½	47½	53	42	85	30	600	3,600	Newport $3 cum. conv. "A"	50	33,000	3.00		29.79
40¾	33	36	46½	33	55⅜	26⅛	33,300	175,900	Penick & Ford	No	425,000	1.00		3.97
...	...	...	...	...	111¼	107			7% cum. pfd.	100	9,000	7.00		73.33
69½	64⅜	66¾	71¼	63	78⅞	52⅜	25,400	106,500	Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30 3.36	
8⅞	5½	6	11⅞	5½	27¼	7⅝	79,900	207,100	Pure Oil Co.	25	3,038,000			1.52
90	86	86	101⅞	86	114¼	90½	880	4,270	8% cum. pfd.	100	130,000	8.00		22.55
37⅛	28	30⅝	42⅝	28	56½	36⅞	89,700	106,500	Royal Dutch, N. Y. shs.		894,000			3.35
22⅛	15⅛	16	30⅜	15⅛	57¼	19¼	32,200	207,100	St. Joseph Lead	10	1,951,000	2.00	2.09	3.82
7½	4⅞	5¼	10¼	4⅞	25½	5¼	124,020	402,840	Shell Union Oil	No	13,071,000			1.26
44¾	33	37	51¾	33	75	42¼	167,600	431,100	Standard Oil, Calif.	No	12,846,000	2.50		3.63
44½	33½	37⅜	52½	33½	84⅞	43½	451,200	1,710,600	Standard Oil, N. J.	25	25,419,000	1.00		4.76
22⅛	17⅝	19	26	17⅝	40⅜	19¾	215,550	688,555	Standard Oil, N. Y.	25	17,809,000	1.60		2.23
7⅝	6	6½	9½	6	17	7⅜	7,400	31,100	Tenn. Corporation	No	857,000	1.00		2.19
29⅛	20	22¾	36¼	20	60½	28¼	284,900	868,200	Texas Corp.	25	9,851,000	3.00		4.91
50	38½	40⅝	55¾	38½	67⅜	40½	294,300	676,600	Texas Gulf Sulphur	No	2,540,000	4.00	5.50	6.40
64⅞	47⅜	54½	72	47⅜	106⅜	52½	580,900	1,405,400	Union Carbide & Carb.	No	9,001,000	2.60		3.94
19½	14¼	16⅞	28¾	14¼	84	14⅜	39,600	349,300	United Carbon Co.	No	398,000		1.43	1.94
43¾	30¾	33	77⅜	30¾	139⅜	50½	100,350	588,450	U. S. Ind. Alc. Co.	No	374,000	6.00	—	12.63
66⅝	37⅝	42¼	76¾	37⅝	143¼	44⅜	1,389,300	5,548,800	Vanadium Corp. of Amer.	No	378,000	3.00		4.91
2¼	1¾	1¾	3	1¾	8⅞	1⅝	3,000	17,000	Virginia Caro. Chem.	No	487,000		Yr. Je. '30 Nil	
13	10⅛	10⅛	17	9½	34¼	9	3,000	9,600	6% cum. part. pfd.	100	213,000		Yr. Je. '30 2.63	
70	64	64	72	64	82⅜	67½	1,700	2,500	7% cum. prior pfd.	100	145,000	7.00	Yr. Je. '30 11.96	
34½	23	24	40	23	59½	18	8,300	46,950	Westvaco Chlorine Prod.	No		2.00	2.51	4.32

NEW YORK CURB

1931 April High	1931 April Low	1931 April Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	Earnings $-per share-$ 1929
5¾	5¼	5½	5¾	4⅞	13	3⅜	600	2,000	Acetol Prod. conv. "A"	No	60,000			0.42
19½	12⅜	14¼	19½	5	34	16	65,700	82,225	Agfa Ansco Corp.	No	300,000			Nil
202	143	150	224	140½	356	140½	23,975	64,825	Aluminum Amer.	No	1,473,000			11.18
109½	109¼	109½	109⅝	106½	111½	104	3,900	11,100	6% cum. pfd.	100	1,473,000	6.00		17.19
89½	75	77	102	57½	232	57½	700	9,000	Aluminum Ltd.	No	573,000			4.15
9¾	6¾	7	12¾	6¾	37	6⅜	64,100	295,600	Amer. Cyanamid "B'	No	2,404,000			4.15
15	9½	10	15	7⅜	43⅜	7⅛	8,300	35,400	Anglo-Chilean Nitrate	No	1,757,000		Yr. Je. '30 Nil	
3½	2⅜	3	4	⅜	6½	⅜	8,600	18,700	Assoc. Rayon Corp.	No	1,200,000		Yr. Je. '30 1.87	
60	57¾	...	60	32¼	60⅜	31¼	7,300	46,800	conv. 6% cum. pfd.	100	200,000	6.00		

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
1⅝	1¼	...	1⅞	1¼	5¼	1⅝	2,000	19,600	Brit. Celanese Am. Rcts.........	2.43	2,806,000			0.03
54	51	...	59	48	90	48	350	1,125	7% cum. part. 1st pfd.......	100	148,000	7.00		14.50
80	77	...	80	68¼	90	70	75	1,055	7% cum. prior pfd..........	100	115,000	7.00		25.70
...	...	...	...	...	20	3½	...	6,340	Celluloid Corp..................	No	195,000			1.76
...	...	...	...	...	103	90¼	...	...	7% cum. 1st part. pfd..	No	24,000	7.00		8.59
8	7⅞	8	9	7¼	13¼	8⅜	1,500	3,400	Courtaulds, Ltd.................	1£				0.34
50½	48	48	51	45	100	49	300	2,400	Dow Chemical.................	No	630,000	2.00		4.08
64⅜	51⅝	53¾	75½	51⅝	166⅞	58½	23,200	110,600	Gulf Oil.......................	25	4,525,000	1.50		9.83
12	11½	12	13	11	23	10½	300	1,900	Heyden Chemical Corp..........	10	150,000			3.08
4⅜	3¾	4⅜	...	...	7	4	1,000	1,000	Imperial Chem. Ind.............	1£				0.49
4¾	4¾	4¾	...	...	16	3½	100	100	Monroe Chem..................	No	126,000			2.54
55	50	50	60	47⅝	79½	45	500	2,300	Shawinigan W. & P.............	No	2,178,000	2.50		2.35
65⅝	60½	60½	66⅛	60	85	58	200	950	Sherwin-Williams Co...........	25	636,000	4.00	Yr. Aug. '30 4.14	
7½	6	6	12	5⅛	34½	3⅝	2,100	18,000	Silica Gel Corp................	No	600,000			
31¾	24⅝	25	38½	24⅝	59⅞	30	183,200	551,500	Standard Oil Ind...............	25	16,851,000	2.50		4.66
28¾	27¾	27¾	30⅜	27¾	34½	27	7,300	26,200	Swift & Co....................	25	6,000,000	2.00		2.18
8¾	6⅛	6⅛	16	3⅝	22¾	3	7,700	122,750	Tubize "B".....................	No	600,000	10.00		
13	12	12	13	10			300	16,400	United Chemicals..............					
25¼	22⅞	22⅞	28⅞	14	44	14	1,000	17,100	$3 cum. part. pfd.	No	115,000	3.00		7.66

CLEVELAND

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
84	78	78	94	78	96	91½	126	1,061	Cleve-Cliffs Iron, $5 pfd.........	No	498,000	5.00	11.42	
66	60½	60½	68½	55½	85	57½	2,116	9,676	Sherwin-Williams Co............	25	636,000	4.00	Yr. Aug. '30 4.14	

CHICAGO

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
39⅞	38¼	39	39⅞	35	46¾	33½	1,900	4,400	Abbott Labs....................	No	145,000	2.50	3.32	4.92
5½	5	5½	5½	4¾	15	3⅛	210	2,490	Monroe Chem...................	No	126,000			2.54
30	25	29½	30	21	35	15¼	240	860	$3.50 cum. pref.............	No	30,000	3.50		13.35
28⅞	28	28⅛	30½	24½	33¼	27	18,500		Swift & Co.....................	25	6,000,000	2.00		2.18

CINCINNATI

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
69½	66½	67⅞	71	61	110	53½	4,045	7,125	Procter & Gamble..............	No	6,410,000	2.40	Yr. Je. '30 3.36	

PHILADELPHIA

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1930	1929
59⅞	58½	59	81¼	58½	100	89	700	1,600	Pennsylvania Salt...............	50	150,000	5.00	Yr. Je. '30 7.97	

The Industry's Bonds

NEW YORK STOCK EXCHANGE

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUE	Date Due	Int. %	Int. Period	Out-standing $
105	104	104	105⅛	102¾	105½	102	35	275	Amer. Agric. Chem., 1st ref. s. f. 7½s........................	1941	7½	F. A.	7,667,000
95	93	93	99	92	100½	93	115	144	Amer. Cyan. deb. 5s..............................	1942	5	A. O.	4,554,000
101½	100	104¼	102	96¾	177	94⅜	280	741	Amer. I. G. Chem. conv. 5½s........................	1949	5½	M. N.	29,933,000
104	102¼	103	104½	102	104	101	330	2,066	Am. Smelt & Ref. 1st. 5s. "A"......................	1947	5	A. O.	36,578,000
81½	75	77	87	65½	98½	67	95	335	Anglo-Chilean s. f. deb. 7s........................	1945	7	M. N.	14,600,000
103¼	101¾	101¾	103	101	103	100	178	575	Atlantic Refin. deb. 5s............................	1937	5	J. J.	14,000,000
102¾	101½	102	104	101½	105½	100¼	93	421	Interlake Iron Corp. 1st 5½s "A"...................	1945	5½	M. N.	6,629,000
104¼	102	103⅛	104½	102	104½	97½	14	37	Corn Prod. Refin. 1st s. f. 5s.....................	1934	5	M. N.	1,822,000
69½	56	57¼	75½	40	87½	38	445	2,661	Lautaro Nitrate conv. 6s...........................	1954	6	J. J.	32,000,000
90¾	80	85	96	80	100½	87	160	450	Pure Oil s. f. 5½% notes...........................	1937	5½	F. A.	17,500,000
97¾	96¼	96½	103	88	104	93¾	68	407	Solvay Am. Invest. 5% notes........................	1942	5	M. S.	15,000,000
103¾	102¾	103¼	105½	102	104¾	100	627	2,062	Standard Oil, N. J. deb. 5s........................	1946	5	F. A.	120,000,000
99	96⅝	98	106½	98¼	104⅛	96½	402	2,029	Standard Oil, N. Y. deb. 4½s.......................	1951	4½	J. D.	50,000,000
92	90	91½	99	89½	102½	90¼	55	121	Tenn. Corporation deb. 6s. "B".....................	1944	6	M. S.	3,308,000

NEW YORK CURB

1931 April High	1931 April Low	Last	1931 High	1931 Low	1930 High	1930 Low	Sales In April	Sales During 1931	ISSUE	Date Due	Int. %	Int. Period	Out-standing $
105⅝	104¾	...	105	102¾	104⅞	100⅛	174,000	841,000	Aluminum Co., s. f. deb. 5s........................	1952	5	M. S.	37,115,000
101	100⅛	101	104¼	97	104½	96⅜	122,000	485,000	Aluminum Ltd., 5s..................................	1948	5	J. J.	20,000,000
...	...	...	56	53	60	51		23,000	Amer. Solv. & Chem. 6½s............................	1936	6½	M. S.	1,737,000
30	26	...	38	26	...	...	12,000	45,000	General Ind. Alc., 6½s.............................	1944	6½	M. N.	2,351,000
50½	50	...	53	45	80	51	15,000	192,000	General Rayon 6s. "A"..............................	1948	6	J. D.	5,085,000
102½	102	...	103	100½	104	90¼	105,000	660,000	Gulf Oil, 5s.......................................	1937	5	J. D.	30,414,000
102⅜	101½	...	104	101	104	99	148,000	506,000	Sinking Fund deb. 5s...............................	1947	5	F. A.	35,000,000
102	101	...	102⅞	99½	103½	95¾	184,000	740,000	Koppers G. & C. deb, 5s............................	1947	5	J. D.	23,050,000
97½	96	96⅛	97⅝	92⅝	98¾	90⅜	413,000	1,414,000	Shawinigan W. & P. 4½s. "A"........................	1967	4½	A. O.	35,000,000
97½	96	...	97½	94½	98¾	90¼	54,000	447,000	4½s., series "B"...................................	1968	4½	M. N.	16,108,000
...	...	...	94	90	107	96		55,000	Silica Gel Corp. 6½s...............................	1932	6½	A. O.	1,700,000
103½	103	103	103⅞	102	103½	79½	66,000	356,000	Swift & Co., 5s....................................	1944	5	J. J.	22,916,000
102¾	102⅝	...	103	101	103½	100½	19,000	116,000	Westvaco Chlorine Prod. 5½s........................	1937	5½	M. S.	1,992,000

The Trend of Prices

IMPORTANT PRICE CHANGES*

Advances	April	March
Alcohol, C. D. 5, tanks	$0.24	$0.19
Carnauba, No. 1 Yellow	.40	.28
Gum Benzoin	.30	.29
Mercury (flask, 76 lb.)	103.00	101.00
Declines		
Acid, Chromic	.14½–.15½	.15–.16
Acid Oxalic	.10¾–.11	.11–.11¼
Acid Tartaric, imported	.29½	.30
Glycerine (lye)	.06	.06¼
Metanitroparatoluidin	1.40	1.50
Methanol 95% drums	.33	.38
97% drums	.34	.39
Tin Crystals	.25	.25¼
Tin Tetrachloride	.18½	.18¾

*Through April 28

The past month has witnessed greater stability in the price structure than has prevailed for several months. While the general trend is still downward fewer openly announced reductions were made and such cuts as were, were generally shading from published schedules. Of first importance of course, was the re-adjustment of prices in the alcohol industry to higher levels. In the first week the price on C. D. 5 in tanks was raised from 19c to 24c. Such business as was done was placed at the higher figure. Spot sales were very light as most of the large consumers were covered at the lower price. In sympathy with the alcohol decline, producers of methanol, 95% and 97%, reduced quotations, but no change was made in the pure synthetic grade. The seasonal demand for several chemicals was felt, shipments of copper sulfate, calcium chloride, ammonia, sodium chlorate and fertilizer material were in fairly good volume, but still not quite up to expectations. Imported tartaric acid was lower, and the tin salts, despite a satisfactory market from the silk-weighting centers, was lower due to further weakness in the metal market. The alkali market continued to be a very quiet and orderly affair, with spot sales limited to replacements and shipments against contracts showing some expansion over last month, but still considerably under the same month in 1930. The fertilizer chemicals were in better demand, specially in the South and the Northeast, but the drought area will consume very little, if any, fertilizer this year. One satisfactory angle is the strength of the various prices and their resistance to further declines.

Coal tar chemicals are moving out in fair quantities to most consuming fields. The exception is the plastics field where curtailment of activity is still very much in evidence. Dyestuffs were finding a better market in both the tanning and the textile industries. In the field of intermediates the trend was somewhat confusing, some items being in excellent demand and others failing to attract any attention. The natural tanstuffs were stronger in the face of renewed buying. Several items were increased.

*Through April 27.

The solvent market showed little change in the period under review. A slight increase in lacquer demand caused shipments of solvents to increase, but stocks are still in excess of current demand. For the first time in several months the price situation seemed to be on a firm footing and producers were more optimistic about the early resumption of normal demand from the plastic field.

Shellac continued at the same level as at the end of last month, naval stores prices were conflicting, with rosin fractionally higher and turpentine firmer. The waxes were a particularly bright spot. Carnauba registering several advances and with Candelilla and Japan likewise higher, the entire picture has shifted to a very bullish market. Stocks immediately available are now down to a very low ebb. Dealers expect further advances as the market tightens. The situation in gums, while not as favorable as the wax market, was better, at least the month to month decline which has been in effect for over a year appeared to be halted and most items were selling at published quotations despite the efforts of consumers to force further shading on sizable orders. In the fine chemical field further improvement was reported and prices were generally firmer.

The barometers of general business conditions are still confusing and conflicting. It is quite evident that the improvement in business conditions is still very slight. The number of apparently false starts are disheartening and disconcerting to many who subconsciously are still looking for the impossible-complete recovery in a few weeks. The history of all of our former periods of business depression point to the necessity of a rather long drawn-out recovery, practically undiscernible at first and then gaining a real momentum only after four or five months.

The stock market was distinctly bearish practically the entire month,* the list falling to new lows for the year. Adverse quarterly statements, coupled with lower prices in raw commodities, and unfavorable foreign news wiped out the gains made in the first two months of the year and brought the general level of the stock market down to the December figures.

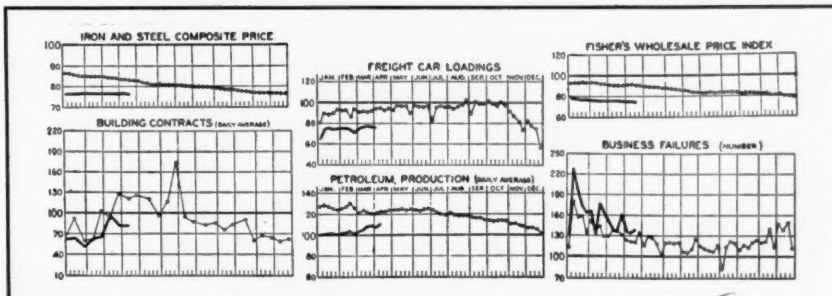
The most distressing feature is the continued drop in the prices of commodities and many new lows, some extending as far back as twenty and thirty years, were made in the first three weeks of April.

Indices of Business

	Latest Available Month	Previous Month	Year Ago
Automobile Production, March	7,001	6,110	7,350
†Brokers Loans, April 25	$1,844	$1,849	$4,217
*Building Contracts, March	$370,406	$235,405	$459,119
*Car Loadings, April 25	737	728	911
†Commercial Paper, Feb. 28	$315	$327	$457
Factory Payrolls, March	74.9	73.2	98.2
*Mail Order Sales, March	$43,008	$39,422	$47,582
Number of Failures Dun, March	$60,386	$59,607	$56,846
*Merchandise Imports, March	$211,000	$175,000	$300,464
*Merchandise Exports, March	$237,000	$226,000	$369,624
Furnaces in Blast %, April 1	37.0	34.4	58.1
*Steel Unfinished Orders, March 31	3,995	3,965	4,570

†000 omitted.
†000,000 omitted.

April 28



Business indicators, Department of Commerce. The weekly average 1923-25 inclusive =100. The solid line represents 1931 and the dotted line 1930

Prices Current

Heavy Chemicals, Coaltar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33*

Due to the fact that the Exposition Number of Chemical Markets is being issued five days ahead of the usual time for the paper's appearance, the Market Report does not cover the complete month of April. Price changes up to and including April 27 are given.

The Chemical Markets Average Price index is not included in this issue, but will be resumed in the June number.

Acetone — The market drifted during the period under review with shipments against existing contracts in fairly good volume but with spot sales rather small. Consuming industries have not shown the improvement that was confidently expected.

Acid Acetic—The fairly steady tone in evidence last month was continued in the first three weeks of April. It is unlikely that any change in price will be made in either direction in the immediate future. February imports totaled 1,466,360 pounds, compared with 3,149,283 pounds in the same month a year ago.

Acid Citric—Further improvement in demand was in evidence during the first three weeks of April. Seasonal demand coupled with small inventory stocks in the hands of consumers brought about a strengthening of the price structure without any alteration, however, in the published prices. Further improvement is expected in May.

Acid Lactic—A quickening of activity in the tanning industry, somewhat belated in its appearance, accounted for a gain in volume of shipments. The price structure remains unchanged from previous months.

Acid Muriatic—No change in either the price or in the market situation has occurred for several months. Despite restricted shipments going into production channels, the price structure has remained firm for several months.

Acid Nitric—Underlying conditions have remained unchanged in this commodity for several months. While tonnages have been somewhat restricted, the price structure has remained firm and unaltered.

Acid Oxalic—Shipments into the coal industry continue below last year, but the demand in other lines remained in fair volume. The price situation changed slightly to 10¾c to 11c¼.

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Acetaldehyde, drs lc-1 wks...lb.	.18½	.21	.18½	.21	.21	.18½	.21	.18½
Acetaldol, 50 gal dr..........lb.	.27	.31	.27	.31	.31	.27	.31	.27
Acetamide.................lb.	.95	1.35	.95	1.35	1.35	1.20		
Acetanilid, tech, 150 lb bbl...lb.	.20	.23	.20	.23	.23	.21	.24	.21
Acetic Anhydride, 92-95%, 100 lb cbys..................lb.	.21	.25	.21	.25	.29	.25	.35	.28
Acetin, tech drums..........lb.	.30	.32	.30	.32	.32	.30	.32	.30
Acetone, tanks,.............lb.	.10	.10½	.10	.10½	.12	.11	.16	.11
Acetone Oil, bbls NY.......gal.	1.15	1.25	1.15	1.25	1.25	1.15	1.25	1.15
Acetyl Chloride, 100 lb cby...lb.	.55	.68	.55	.68	.68	.55	.68	.45
Acetylene Tetrachloride (see tetrachlorethane).............								
Acids								
Acid Acetic, 28% 400 lb bbls c-1 wks.............100 lb.	.....	2.60	.....	2.60	3.88	2.60	3.88	3.88
Glacial, bbl c-1 wk.....100 lb.	.....	9.23	.....	9.23	13.68	9.23	13.68	13.68
Glacial, tanks................	.....	8.98	.....	8.98	13.43	8.98		
Anthranilic, refd, bbls........lb.	.85	.95	.85	.95	1.00	.85	1.00	.98
Technical, bbls............lb.	.65	.70	.65	.80	.80	.75	.80	.80
Battery, cbys...........100 lb.	1.60	2.25	1.60	2.25	2.25	1.60	2.25	1.60
Benzoic, tech, 100 lb bbls....lb.	.40	.45	.40	.45	.53	.40	.60	.51
Boric, crys. powd, 250 lb. bbls..................lb.	.06½	.07	.06½	.07¾	.07¾	.06¾	.07¾	.05¾
Broenner's, bbls............lb.	1.20	1.25	1.20	1.25	1.25	1.20	1.25	1.25
Butyric, 100% basis cbys.....lb.	.80	.85	.80	.85	.90	.80	.90	.85
Camphoric.................lb.	.....	5.25	.....	5.25	5.25	5.25	5.25	4.85
Chlorosulfonic, 1500 lb drums wks....................lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½	.04½
Chromic, 99%, drs extra.....lb.	.14½	.16	.14½	.17	.19	.15	.23	.17½
Chromotropic, 300 lb bbls....lb.	1.00	1.06	1.00	1.06	1.06	1.00	1.06	1.00
Citric, USP, crystals, 230 lb. bbls..................lb.	.37	.37½	.37	.43	.59	.40	.70	.46
Cleve's, 250 lb bbls..........lb.	.52	.54	.52	.54	.54	.52	.59	.52
Cresylic, 95%, dark drs NY..gal.	.47	.60	.47	.60	.70	.54	.54	.60
97-99%, pale drs NY.....gal.	.50	.60	.50	.60	.77	.58	.77	.72
Formic, tech 90%, 140 lb. cby....................lb.	.10½	.12	.10½	.12	.12	.10½	.12	.10½
Gallic, tech, bbls............lb.	.60	.70	.60	.70	.55	.50	.12	.50
USP, bbls................lb.	.....	.74	.....	.74	.74	.74	.55	.74
Gamma, 225 lb bbls wks.....lb.	.77	.80	.77	.80	.80	.77	.80	.74
H, 225 lb bbls wks..........lb.	.65	.70	.65	.70	.70	.65	.99	.80
Hydriodic, USP, 10% soln cby lb.	.....	.67	.....	.67	.67	.67	.72	.67
Hydrobromic, 48%, coml, 155 lb cbys wks.............lb.	.45	.48	.45	.48	.48	.45	.67 .48	.45
Hydrochloric, CP, see Acid Muriatic..................					.....	.....	.....	.....
Hydrocyanic, cylinders wks...lb.	.80	.90	.80	.90	.90	.80	.90	.80
Hydrofluoric, 30%, 400 lb bbls wks....................lb.	.....	.06	.....	.06	.06½	.06	.06	.06
Hydrofluosilicic, 35%, 400 lb bbls wks..............lb.	...11	.12	.11	.12	.12	.11	.11	.11
Hypophosphorous, 30%, USP, demijohns..............lb.	.....	.85	.....	.85	.85	.85	.85	.85
Lactic, 22%, dark, 500 lb bbls lb.	.04	.04½	.04	.04½	.05	.04	.05¼	.04½
44%, light, 500 lb bbls......lb.	.11½	.12	.11½	.12	.12	.11	.12½	.11
Laurent's, 250 lb bbls........lb.	.36	.42	.36	.42	.42	.36	.42	.40
Malic, powd., kegs...........lb.	.45	.60	.45	.60	.60	.45	.60	.48
Metanilic, 250 lb bbls........lb.	.60	.65	.60	.65	.65	.60	.65	.60
Mixed Sulfuric-Nitric..........								
tanks wks..........N unit	.07	.07½	.07	.07¼	.07½	.07	.07½	.07
tanks wks..........S unit	.008	.01	.008	.01	.01	.008	.01	.008
Monochloroacetic, tech bbl..lb.	.20	.30	.20	.30	.30	.18	.21	.18
Monosulfonic, bbls..........lb.	1.65	1.70	1.65	1.70	1.70	1.65	1.70	1.65
Muriatic, 18 deg, 120 lb cbys c-1 wks.............100 lb.	.....	1.35	.....	1.35	1.35	1.35	1.40	1.35
tanks, wks. 100 lb.		1.00	.....	1.00	1.00	1.00	1.00	1.00
20 degrees, cbys wks...100 lb.	.....	1.45	.....	1.45	....	1.45	....	1.45
N & W, 250 lb bbls............	.85	.95	.85	.95	.95	.85	.95	.85
Naphthionic, tech, 250 lb.......	.....	Nom.	.....	Nom.	Nom.	.....	.59	.55
Nitric, 36 deg, 135 lb cbys c-wks...............100 lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
40 deg, 135 lb cbys, c-1 wks...............100 lb.	.....	6.00	.....	6.00	6.00	6.00	6.00	6.00
Oxalic, 300 lb bbls wks NY...lb.	.10¾	.11¼	.10¾	.11½	.11¾	.11	.11¾	.11
Phosphoric 50%, U. S. P.....lb.	.....	.14	.....	.14	.14	.14	.14	.08
Syrupy, USP, 70 lb drs....lb.	.....	.14	.....	.14	]	.14	.16	.14
Commercial, tanks,.....Unit.	.....	.80	.....	.80	.80	.80	.....	.....
Picramic, 300 lb bbls........lb.	.65	.70	.65	.70	.70	.65	.70	.65
Picric, kegs.................lb.	.30	.50	.30	.50	.50	.30	.50	.30
Pyrogallic, crystals.......................lb.	1.50	1.60	1.50	1.60	1.60	1.30	1.40	.86
Salicylic, tech, 125 lb bbl.....lb.	.33	.37	.33	.37	.37	.33	.42	.33
Sulfanilic, 250 lb bbls........lb.	.15	.16	.15	.16	.16	.15	.16	.15
Sulfuric, 66 deg, 180 lb cbys lc-1 wks...........100 lb.	1.60	1.95	1.60	1.95	1.95	1.60	1.95	1.60
tanks, wks. ton		15.00	.....	15.00	15.50	15.00	15.50	15.50
1500 lb dr wks......100 lb.	1.50	1.65	1.50	1.65	1.65	1.50	1.65	1.50
60°, 1500 lb dr wks....100 lb.	1.27½	1.42½	1.27½	1.42½	1.42½	1.27½	1.42½	1.27½
Oleum, 20%, 1500 lb. drs lc-1 wks...................ton	.....	1[illegible].50	.....	18.50	18.50	18.50	18.50	18.50

*Approximate

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

Acid Sulfuric — With some improvement noticeable in many consuming lines, the market assumed a firmer tone and spot sales were made at published quotations. Fertilizer companies were seasonally more active and a reduction in existing stocks was reported. Consumption of sulfuric acid by the fertilizer trade during February fell below both the previous month and the corresponding period last year, according to the Bureau of the Census. Consumption was 148,690 tons, compared with 188,229 tons during January and 220,234 tons during February last year. For the first two months, consumption of acid in the making of fertilizers was 336,919 tons, against 466,274 tons during the same time last year, and 435,134 tons during the first two months of 1929. Production, as reported by fertilizer manufacturers during February was 156,239 tons, and for the two months, 320,638 tons, against 390,630 tons last year, and 400,685 for the same period two years ago.

Alums—Shipments against existing contracts were reported in satisfactory volume, but new business was spotty. The price situation appears to have stabilized itself and producers were adhering strictly to published prices. February exports totaled 3,358,906 pounds, compared with 3,666,987 pounds in the same month a year ago.

Ammonia, Anhydrous — The rather summer-like weather prevailing in the eastern section of the country caused a noticeable increase in shipments against contracts. Spot business was light with prices firmly held.

Ammonia Aqua—The market in the water was a very routine affair, but at prices unchanged from former quotations. The demand from the textile centers slowed up somewhat, but stocks are not excessive and indications point to a continuance of present price level.

Ammonium Sulfate — Like sodium nitrate, the demand for the sulfate in the southeastern portion was good, but in the southwest drought States, it is quite apparent that sales will not be up to former levels, even to those of 1930. Shipments into the northeastern states were fair. The price of $35 a ton at ports was well maintained.

Antimony — The metal market was exceedingly slow during the period under review, practically reaching the point of stagnation. The drift in prices was slightly lower.

Arsenic — With the seasonal demand from the insecticide producers now on, a decided improvement was noticeable, but still shipments are below normal. A firm

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
40%, lc-1 wks net ....ton	.....	42.00	.....	42.00	42.00	42.00	42.00	42.00
Tannic, tech, 300 lb bbls...lb.	.23	.40	.23	.40	.40	.23	.40	.30
Tartaric, USP, gran. powd, 300 lb. bbls..............lb	.....	.31½	.....	.31½	.38½	.33	.38½	.38
Tobias, 250 lb bbls.........lb.	.....	.85	.....	.85	.85	.85	.85	.85
Trichloroacetic bottles......lb.	.....	2.75	.....	2.75	2.75	2.75	2.75	2.75
Kegs..................lb.	.....	2.00	.....	2.00	2.00	2.00	2.00	2.00
Tungstic, bbls............lb.	1.40	1.70	1.40	1.70	1.70	1.40	2.25	1.00
Albumen, blood, 225 lb bbls..lb.	.38	.40	.38	.40	.40	.38	47	.38
dark,.............bbls., lb.	.12	.20	.12	.20	.20	.12	.20	.12
Egg, edible...............lb.	.55	.56	.55	.56	.75	.55	.83	.70
Technical, 200 lb cases ..lb.	.50	.55	.50	.55	.73	.50	.80	.70
Vegetable, edible..........lb.	.60	.65	.60	.65	.65	.60	.65	.60
Technical..............lb.	.50	.55	.50	.55	.55	.50	.55	.50
Alcohol								
Alcohol Butyl, Normal, 50 gal drs c-1 wks.............lb.	.16¼	.17¼	.16¼	.17¼	.18¼	.17¼	.17¾	.17¼
Drums, 1-c-1 wks........lb.	.16¾	.17¾	.16¾	.17¾	.18¾	.17¾	.18¼	.17¾
Tank cars wks..........lb.	.15¾	.16¾	.15¾	.16¾	.17¾	.16¾	.17½	.16¾
Amyl (from pentane) Tanks wks.............lb.	.....	.236	.....	.236	.236	.236	1.67	1.67
Diacetone, 50 gal drs del..gal.	1.42	1.60	1.42	1.60	1.60	1.42	1.80	1.42
Ethyl, USP, 190 pf, 50 gal bbls................gal.	.....	2.37	2.37	2.75	2.75	2.63	2.75	2.69½
Anhydrous, drums.......gal.	.54	.58	.54	.60	.71	.56	.71	.71
No. 5, 188 pf, 50 gal drs. drums extra.........gal.	.27	.29	.27	.44	50	.40	.51	.48
Tank, cars.............gal.	.....	.24	.24	.38	.48	.37	.50	.46
Isopropyl, ref, gal drs.....gal.	.90	1.00	.90	1.00	1.00	.60	1.30	1.00
Propyl Normal, 50 gal dr..gal.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Alcotate, tanks............gal.	.....	.60	.60	.60	.....	.....	.....	.....
Aldehyde Ammonia, 100 gal dr lb.	.80	.82	.80	.82	.82	.80	.82	.80
Alpha-Naphthol, crude, 300 lb bbls..................lb.	.60	.65	.60	.65	.65	.60	.65	.65
Alpha-Naphthylamine, 350 lb bbls..................lb.	.32	.34	.32	.34	.34	.32	.34	.32
Alum Ammonia, lump, 400 lb bbls, lc-1 wks.......100 lb.	3.20	3.50	3.20	3.50	3.50	3.20	3.50	3.25
Chrome, 500 lb casks, wks ....100 lb.	4.50	5.25	4.50	5.25	5.25	4.50	5.50	5.00
Potash, lump, 400 lb casks wks...............100 lb.	3.25	3.50	3.10	3.50	3.50	3.10	3.50	3.00
Soda, ground, 400 lb bbls wks...............100 lb.	3.50	3.75	3.50	3.75	3.75	3.50	3.75	3.75
Aluminum Metal, c-1 NY.100 lb.	22.90	24.30	22.90	24.30	24.30	24.30	24.30	24.30
Chloride Anhydrous,......lb.	.05	.09	.05	.09	.15	.05	.20	.05
Hydrate, 96%, light, 90 lb bbls..................lb.	.16	.17	.16	.17	.18	.16	.18	.17
Stearate, 100 lb bbls.......lb.	.18	.21	.18	.22	.26	.19	.26	25
Sulfate, Iron, free, bags c-1 wks..............100 lb.	1.90	1.95	1.90	1.95	2.05	1.90	2.05	1.95
Coml, bags c-1 wks..100 lb.	1.25	1.30	1.25	1.30	1.40	1.25	1.40	1.40
Aminoazobenzene, 110 lb kegs lb.	.....	1.15	.....	1.15	1.15	1.15	1.15	1.15
Ammonium								
Ammonia anhydrous Com. tanks	.....	.05⅝	.....	.05⅝	.05⅝	.05⅝		
Ammonia, anhyd, 100 lb cyl..lb.	.15½	.15½	.15½	.15½	.15½	.15½	.14½	.14
Water, 26°, 800 lb dr del...lb.	.....	.03½	.....	.03½	.03½	.03½	.03½	.03½
Ammonia, aqua 26° tanks....	.....	.02¾	.02½	.02¾	.02¾	.02½		
Acetate..................lb.	.28	.39	.28	.39	.39	.28		
Bicarbonate, bbls., f.o.b. plant ....100 lb.	.....	5.15	.....	5.15	5.15	5.15	6.50	5.15
Bifluoride, 300 lb bbls......lb.	.21	.22	.21	.22	.22	.21	.22	.21
Carbonate, tech, 500 lb cs..lb.	.10½	.12	.09	.12	.12	.09	.12	.09
Chloride, white, 100 lb. bbls wks..............100 lb.	4.45	5.15	4.45	5.15	5.15	4.45	5.15	4.45
Gray, 250 lb bbls wks....lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Lump, 500 lb cks spot...lb.	.11	.11½	.11	.11½	.11½	.11	.11½	.11
Lactate, 500 lb bbls.......lb.	.15	.16	.15	.16	.16	.15	.16	.15
Ammonium Linoleate.....lb.	.15	.15	.15	.....	.....	.....	.....	.....
Nitrate, tech, casks........lb.	.06	.10	.06	.10	.10	.06	.10	.06
Persulfate, 112 lb kegs.....lb.	.26	.30	.26	.30	.30	.26	.34	.26
Phosphate, tech, powd, 325 lb bbls..................lb.	.11½	.12	.11½	.12	.13	.11½	.13	.12½
Sulfate, bulk c-1.......100 lb.	.....	1.80	1.70	1.80	2.10	1.75	2.40	2.05
Southern points.....100 lb.	.....	1.88	1.70	1.75	2.10	1.82½	2.45	2.05
Nitrate, 26% nitrogen 31.6% ammonia imported bags c. i. f.........ton	34.60	35.00	34.60	35.00	57.60	45.00	60.85	52.40
Sulfocyanide, kegs........lb.	.36	.48	.36	.48	.48	.36	.48	.36
Amyl Acetate, (from pentane) Tanks................lb.	.....	.222	.....	.222	.236	.222	1.70	1.60
Tech., drs................lb.	.225	.236	.225	.236	.24	.225	.24	.23
Alcohol, see Fusel Oil........								
Furoate, 1 lb tins.........lb.		5.00	.....	5.00	5.00	5.00		
Aniline Oil, 960 lb drs........lb.	.14½	.16	.14½	.16	.16	.15	.16½	.15
Annatto, fine...............lb.	.34	.37	.34	.37	.37	.34	.37	.34
Anthraquinone, sublimed, 125 lb bbls..................lb.	.50	.55	.50	.55	.90	.50	.90	.80
Antimony, metal slabs, ton lots ....lb.	.07	.07⅛	.07	.07⅛	.09¼	.06½	.10	.08⅝
Needle, powd, 100 lb cs....lb.	.08½	.09	.08½	.09	.09¼	.08	.10	.09
Chloride, soln (butter of) cbys..................lb.	.13	.17	.13	.17	.17	.13	.18	.13
Oxide, 500 lb bbls.........lb.	.08¾	.08¾	.08½	.08¾	.08¾	.07½	.10	.08¾
Salt, 66%, tins............lb.	.22	.24	.22	.24	.24	.22	.26	.24
Sulfuret, golden, bbls......lb.	.16	.20	.16	.20	.20	.16	.20	.16
Vermilion, bbls............lb.	.38	.42	.38	.42	.42	.38	.42	.38
Archil, conc, 600 lb bbls......lb.	.17	.19	.17	.19	.19	.17	.19	.17
Double, 600 lb bbls........lb.	.12	.14	.12	.14	.14	.12	.14	.12
Triple, 600 lb bbls.........lb.	.12	.14	.12	.14	.14	.12	.16	.12
Argols, 80%, casks..........lb.	.....	.18¾	.....	.18¾	.18¾	.18¾	.18¾	.18¾
Crude, 30%, casks........lb.	.07	.07½	.07	.08	.08	.07¾	.08	.08

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

tone prevailed in the market for the white, while the red was held at fairly firm levels.

Alcohol—After reaching a price of 19c openly quoted the alcohol market steadied, and on April 4, the price on C.D.5 was restored to 24c in tanks, 27c in carlots in drums, and 29c for less than carload. Since the stabilization of the price the market has become very quiet and sales have been limited to very small spot lots. It is hardly likely that the trend of the market will be anything other than upward in the future with the selling price very close to the cost of production. Just when such an advance is likely is open to considerable speculation however, and undoubtedly will not take place until a much greater demand is in evidence. Leading factors in the market say that the bottom has been reached. The 24c price is against contracts for the balance of the year.

Benzoin Gum—An encouraging sign for the early return of the gum market to something like normalcy was forecast by an increase of 1c in this commodity. The remaining gums failed to join the upward procession, but at least in the first few weeks of the month they presented a firmer front against further lowering of prices.

Benzol—Buyers continued to hold committments very close to actual immediate needs, with the result that the market while generally steady, did not act as well as was expected. Jobbing demand and spot requirements from consumers were about the only inquiries in the market. The further drop in steel mill operation added a decidedly bearish tone to the market.

Bleaching Powder—Shipments against existing contracts continued to show up favorably when comparison is had with the figures for the last quarter. Spot business was better in the first three weeks of April than in March. February imports amounted to 85,951 pounds, compared with 123,112 pounds in the same month a year ago. February exports totaled 115, 720 pounds, against 121,198 pounds in the similar month a year ago.

Borax—The market in this commodity continued along the lines that it has taken for several months. Shipments are reported as being fairly satisfactory as far as tonnage is concerned while prices remain unchanged. The German imports of refined borax during 1930 were 8,703 metric tons while those of 1929 were 9,465 tons. The imports of borax ore for the same years were 22,178 and 20,727 tons, respectively. During 1930 imports of refined borax from the United States amounted to 7,983 tons and those of borax ore 18,954 tons. The increase in the im-

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Aroclors, wks...............lb.	.20	.40	.20	.40	.40	.20	.....	.....
Arsenic, Red. 224 lb kegs, cs..lb.	.09¾	.10	.09¾	.10	.11	.08¾	.11	.09
White, 112 lb kegs.........lb.	.04	.05	.03¾	.05	.04½	.03¾	.04½	.04
Asbestine, c-1 wks..........ton	.....	15.00	.....	15.00	15.00	15.00	15.00	4.75
Barium								
Barium Carbonate, 200 lb bags wks....................ton	58.00	60.00	58.00	60.00	60.00	58.00	60.00	57.00
Chlorate, 112 lb kegs NY..lb.	.14	.15	.14	.15	.15	.14	.15	.14
Chloride, 600 lb bbl wks...ton	63.00	69.00	63.00	69.00	69.00	63.00	69.00	63.00
Dioxide, 88%, 690 lb drs...lb.	.12	.13	.12	.13	.13	.12	.13	.12
Hydrate, 500 lb bbls.......lb.	.04¾	.05½	.04¾	.05½	.05½	.04¾	.05½	.04¾
Nitrate, 700 lb casks.......lb.	.07½	.08¼	.07½	.08¼	.08¼	.07½	.08½	.08
Barytes, Floated, 350 lb bbls wks....................ton	23.00	24.00	23.00	24.00	24.00	23.00	24.00	23.00
Bauxite, bulk, mines........ton	5.00	8.00	5.00	8.00	8.00	5.00	8.00	5.00
Beeswax, Yellow, crude bags..lb.	.24	.31	.24	.31	.34	.24	.37	.34
Refined, cases...........lb.	.....	.37	.....	.37	.38	.37	.42	.39
White, cases..............lb.	.34	.36	.34	.36	.53	.34	.53	.51
Benzaldehyde, technical, 945 lb drums wks.............lb.	.60	.65	.60	.65	.65	.60	.65	.60
Benzene								
Benzene, 90%, Industrial, 8000 gal tanks wks..........gal.	.....	.21	.....	.21	.22	.21	.23	.23
Ind. Pure, tanks works....gal.	.....	.21	.....	.21	.22	.21	.23	.23
Benzidine Base, dry, 250 lb bbls...................lb.	.65	.67	.65	.67	.74	.65	.74	.70
Benzoyl, Chloride, 500 lb drs.lb.	.45	.47	.45	.47	1.00	.45	1.00	1.00
Benzyl, Chloride, tech drs....lb.	.....	.30	.....	.30	.25	.25	.25	.25
Beta-Naphthol, 250 lb bbl wk.lb.	.22	.24	.22	.24	.24	.22	.26	.22
Naphthylamine, sublimed, 200 lb bbls.................lb.	1.25	1.35	1.25	1.35	1.35	1.25	1.35	1.35
Tech, 200 lb bbls..........lb.	.58	.65	.58	.65	.65	.53	.68	.60
Blanc Fixe, 400 lb bbls wks..ton	75.00	90.00	75.00	90.00	90.00	75.00	90.00	75.00
Bleaching Powder								
Bleaching Powder, 300 lb drs c-1 wks contract.......100 lb.	2.00	2.35	2.00	2.35	2.35	2.00	2.25	2.00
Blood, Dried, fob, NY......Unit	2.75	3.00	2.70	3.00	3.90	3.00	4.60	3.90
Chicago................Unit	.....	2.35	.....	2.35	4.50	2.75	5.00	4.40
S. American shipt.......Unit	2.95	3.20	2.95	3.20	4.10	3.15	4.70	4.25
Blues, Bronze Chinese Milori Prussian Soluble........lb.	.....	.35	.....	.35	.35	.35	.35	.32
Bone, raw, Chicago.........ton	31.00	32.00	31.00	32.00	39.00	31.00	42.00	39.00
Bone, Ash, 100 lb kegs.......lb.	.06	.07	.06	.07	.07	.06	.07	.06
Black, 200 lb bbls.........lb.	.05½	.08½	.05½	.08½	.08¼	.05½	.08½	.08¼
Meal, 3% & 50%, Imp....ton	.....	31.00	.....	31.00	31.00	31.00	35.00	30.00
Borax, bags...............lb.	.02½	.03½	.02½	.03½	.03¼	02½	.03½	.02½
Bordeaux, Mixture, 16% pwd..lb.	.11½	.13	.11½	.13	.14	.12	.14	.10½
Paste, bbls...............lb.	.11½	.13	.11½	.13	.14	.12	.14	.10
Brazilwood, sticks, shpmt....lb.	26.00	28.00	26.00	28.00	28.00	26.00	28.00	26.00
Bromine, cases.............lb.	.36	.43	.36	.43	.47	.38		
Bronze, Aluminum, powd blk.lb.	.60	1.20	.60	1.20	1.20	.60	1.20	.60
Gold bulk................lb.	.55	1.25	.55	1.25	1.25	.55	1.25	.55
Butyl, Acetate, normal drs..lb.	.17	.175	.17	.175	.20	.17	.195	.184
Tank, wks..............lb.	.16	.175	.16	.175	.186	.16	.186	.181
Aldehyde, 50 gal drs wks...lb.	.34	.44	.34	.44	.44	.34	.70	.34
Carbitol s ee Diethylene Glycol Mono (Butyl Ether)........	.....	.....	.....	.....	.....	.....	.....	.....
Cellosolve (see Ethylene glycol mono b utyl ether).........								
Furoate, tech., 50 gal. dr., lb.	.....	.50	.....	.50	.50	.50	.50	.50
Propionate, drs...........lb.	.22	.25	.22	.25	.27	.22	.36	.25
Stearate, 50 gal drs........lb.	.25	.30	.25	.30	.30	.25	.60	.25
Tartrate, drs.............lb.	.55	.60	.55	.60	.60	.55	.60	.57
Cadmium, Sulfide, boxes.....lb.	.80	.90	.80	.90	1.75	.90	1.75	.75
Calcium								
Calcium, Acetate, 150 lb bags c-1................100 lb.	.....	2.00	.....	2.00	4.50	2.00	4.50	4.50
Arsenate, 100 lb bbls c-1 wks....................lb.	.07	.09	.07	.09	.09	.07	.09	.07
Carbide, drs..............lb.	.05	.06	.05	.06	.06	.05	.06	.05
Carbonate, tech, 100 lb bags c-1....................lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, Flake, 375 lb drs c-1 wks...............ton	.....	22.75	.....	22.75	22.75	22.75	25.00	22.75
Solid, 650 lb drs c-1 fob wks ....ton	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Nitrate, 100 lb bags.......ton	40.00	43.00	40.00	43.00	43.00	40.00	52.00	42.00
Peroxide, 100 lb. drs.......lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Phosphate, tech, 450 lb bbls lb.	.08	.08¾	.08	.08¾	.08¾	.08	.08	.07
Stearate, 100 lb bbls.......lb.	.18	.22	.18	.22	.26	.19	.26	.25
Calurea, bags S. points. c.i.f. ton	.....	88.65	.....	88.65	88.65	88.65	88.15	82.15
Camwood, Bark, ground bbls..lb.	.....	.18	.....	.18	.18	.18	.18	.18
Candelilla Wax, bags........lb.	.14½	.15	.13	.15	.20	.15	.24	.22
Carbitol, (See Diethylene Gycol Mono Ethyl Ether)........	.....	.....	.....	.....	.....	.....	.....	.....
Carbon, Decolorizing, 40 lb bags c-1....................lb.	.08	.15	.08	.15	.15	.08	.15	.08
Black, 100-300 lb cases 1c-1 NY....................lb.	.06	.12	.06	.12	.12	.06	.12	.12
Bisulfide, 500 lb drs 1c-1 NY....................lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Dioxide, Liq. 20-25 lb cyl...lb.	.....	.06	.....	.06	.18	.06	.06	.06
Tetrachloride, 1400 lb drs delivered...............lb.	.06½	.07	.06½	.07	.07	.06½	.07½	.06½
Carnauba Wax, Flor, bags....lb.	.26	.28	.26	.28	.37	.28	.43	.35
No. 1 Yellow, bags........lb.	.....	.40	.23	.40	.33	.25	.40	.33
No. 2 N Country, bags.....lb.	.....	.23	.18	.23	.27	.20	.32	.28
No. 2 Regular, bags.......lb.	.22	.23	.21	.23	.30	.23	.36	.31
No. 3 N. C...............lb.	.15	.16	.14½	.16	.23	.16	.25	.24
No. 3 Chalky.............lb.	.14½	.15½	.14	.15½	.23	.16	.26	.24
Casein, Standard, Domestic.... ground...................lb.	.08	.08½	.08	.10	.15½	.09½	.17	.15

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

ports of borax ore was primarily due to the increased purchases by German interests of a natural sodium borate produced in California.

Butyl Alcohol—While the lacquer industry has not exhibited the increase that was looked for, there is no question but what demand from the automotive industry has been greater and shipments of solvents employed by the lacquer industry have been better in March and April than in the previous two months.

Calcium Acetate — The market remained quiet without any basic changes being made in the market outlook.

Candelilla Wax — On April 19 dealers announced an increase of ½c, the new level being 14½c.

Carnauba—The very strong position in this commodity last month (March) was continued into April and three distinct advances were made, one on April 3, another on April 10, and another on April 19. The present market is based on the following prices, No. I 40c., and increase of 12c from the price at the end of March, No. 2 36c, No. 2. N. C. 23c; No. 3 N. C., 16c, chalky, 15½c.

Copperas — As long as steel production is held at 50 per cent of capacity there is little likelihood of any downward revision in the price. Present indications do not point to any improvement in the steel rate through the summer period.

Carbon Tetrachloride — Trading was only of a routine nature. Large users are still taking only part of their normal requirements. The price remained unchanged. Of the 45,266 pounds ($1,794) of carbon tetrachloride exported from the United States during January, 1931, 43,275 pounds went to Canada. The latter country also received 81,650 pounds of the 86,721 pounds ($5,143) of carbon bisulphide exported from the United States in January.

Copper Sulfate — Movement into the agricultural field was in good volume during the period under review. The price situation remained unchanged and will likely remain so, as long as the metal market continues to fluctuate in the narrow limits of 9½-10c. Exports continue to be a very encouraging feature of the situation. Importation of copper sulfate in February totaled 426,858 pounds, against 437,921 pounds in the same period a year ago. A decided improvement was noted in the export market, with February outgoings amounting to 950,586 pounds, compared with 365,002 pounds in the corresponding period a year ago. Italian copper sulfate production during 1930 was 68,750 metric tons compared with 72,495 tons in 1929,

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cellosolve (see Ethylene glycol mono ethyl ether).........								
Acetate (see Ethylene glycol mono ethyl ether acetate)..								
Celluloid, Scraps, Ivory cs....lb.	.13	.15	.13	.15	.20	.20	.30	.20
Shell, cases...............lb.	.18	.20	.18	.20	.20	.18	.20	.18
Transparent, cases........lb.	.....	.15	.....	.15	.15	.15	.32	.15
Cellulose, Acetate, 50 lb kegs .lb.	.80	1.25	.80	1.25	1.25	.80	1.25	1.20
Chalk, dropped, 175 lb bbls...lb.	.03	.03¾	.03	.03¾	.03¾	.03	.03¾	.03
Precip, heavy, 560 lb cks...lb.	.02	.03½	.02	.03½	.03½	.02	.03½	.02
Light, 250 lb casks........lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02½
Charcoal, Hardwood, lump, bulk wks...................bu.	.18	.19	.18	.19	.19	.18	.19	.18
Willow, powd, 100 lb bbl wks...................lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06
Wood, powd, 100 lb bbls...lb.	.04	.05	.04	.05	.05	04	.05	.04
Chestnut, clarified bbls wks,..lb.	.02	.03	.02	.03	.03	.02½	.02	.03¼
25% tks wks.............lb.	.01¾	.02½	.01¾	.02½	.02½	.01¾	.02½	.01¾
Powd, 60%, 100 lb bgs wks.lb.	.....	.04½	.....	.04½	.04½	.04½	.04 4/5	.04½
Powd, decolorized bgs wks..lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
China Clay, lump, blk mines.ton	8.00	9.00	8.00	9.00	9.00	8.00	9.00	8.00
Powdered, bbls...........lb.	.01¾	.02	.01¾	.02	.02	.01¾	.02	.01¾
Pulverized, bbls wks......ton	10.00	12.00	10.00	12.00	12.00	10.00	12.00	10.00
Imported, lump, bulk.....ton	15.00	25.00	15.00	25.00	25.00	15.00	25.00	15.00
Powdered, bbls...........lb.	.01¾	.03	.01¾	.03	.03	.01¾	.03½	.01¾
Chlorine								
Chlorine, cyls 1c-1 wks contract ....lb.	.07	.08½	.07	.08½	.08½	.07	.08½	.07
cyls, cl wks,. contract ...lb.	.04	.04½	.04	.04½	.04½	.04	.04½	.04½
Liq tank or multi-car lot cyls wks contract............lb.	.01¾	.02½	.01¾	.02½	.025	.01¾	.03	.025
Chlorobenzene, Mono, 100 lb. drs 1c-1 wks............lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.08½
Chloroform, tech, 1000 lb drs..lb.	.15	.16	.15	.16	.16	.15	.20	.16
Chloropicrin, comml cyls.....lb.	1.00	1.35	1.00	1.35	1.35	1.00	1.35	1.00
Chrome, Green, CP..........lb.	.26	.29	.26	.29	.29	.26	.29	.26
Commercial...............lb.	.06½	.11	.06½	.11	.11	.06½	.11	.06½
Yellow...................lb.	.16	.18	.16	.18	.18	.16	.18	.15
Chromium, Acetate, 8% Chrome bbls.................lb.	.04¾	.05¾	.04¾	.05¾	.05¾	.04¾	.05¾	.04¾
20° soln, 400 lb bbls.....lb.	.....	.05½	.....	.05½	.05½	.05½	.05½	.05½
Fluoride, powd, 400 lb bbl..lb.	.27	.28	.27	.28	.28	.27	.28	.27
Oxide, green, bbls.........lb.	.34½	.35½	.34½	.35½	.35½	.34½	.35½	.34½
Coal tar, bbls..............bbl	10.00	10.50	10.00	10.50	10.50	10.00	10.50	10.00
Cobalt Oxide, black, bags....lb.	2.10	2.22	2.10	2.22	2.22	2.10	2.22	2.10
Cochineal, gray or black bag..lb.	.52	.57	.52	.57	1.01	.52	1.01	.95
Teneriffe silver, bags.......lb.	.....	.57	.55	.57	.95	.54	.95	.95
Copper								
Copper, metal, electrol....100 lb.	9.75	10.00	9.75	10.36	17.78	9.50	24.00	17.00
Carbonate, 400 lb bbls.....lb.	.08½	.16½	.08½	.16½	.21½	.08½	.25	.13
Chloride, 250 lb bbls.......lb.	.22	.25	.22	.25	.28	.22	.28	.25
Cyanide, 100 lb drs........lb.	.41	.42	.41	.42	.45	.41	.60	.44
Oxide, red, 100 lb bbls.....lb.	.15½	.18	.15½	.18	.32	.15½	.32	.16½
Sub-acetate verdigris, 400 lb bbls..................lb.	.18	.19	.18	.19	.19	.18	.19	.18
Sulfate, bbls c-1 wks...100 lb.	4.25	4.95	4.00	4.95	5.50	3.95	7.00	5.50
Copperas, crys and sugar bulk c-1 wks...............ton	13.00	14.00	13.00	14.00	14.00	13.00	14.00	13.00
Cotton, Soluble, wet, 100 lb bbls.....................lb.	.40	.42	.40	.42	.42	.40	.42	.40
Cottonseed, S. E. bulk c-1...ton	.....	26.50	.....	26.50	.....	.....	.....	.....
Meal S. E. bulk..........ton	.....	.....	.....	.....	.....	.....	.....	.....
7% Amm., bags mills...ton	37.50	38.00	37.50	38.00	38.00	37.50	38.00	37.50
Cream Tartar, USP, 300 lb. bbls..................lb.	.24	.24½	.24	.24½	.27	.24¼	.28	26¼
Creosote, USP, 42 lb cbys....lb.	.40	.42	.40	.42	.42	.40	.42	.40¼
Oil, Grade 1 tanks.......gal.	.13	.14	.13	.14	.16	.15	.19	.15
Grade 2...............gal.	.11	.12	.11	.12	.14	.13	.23	.13
Grade 3...............gal.	.11	.12	.11	.12	.14	.13	.28	.13
Cresol, USP, drums..........lb.	.13	.17	.13	.17	.17	.14	.17	.14
Crotonaldehyde, 50 gal dr....lb.	.32	.36	.32	.36	.36	.32	.36	.32
Cudbear, English............lb.	.16	.17	.16	.17	.17	.16	.17	.16
Cutch, Rangoon, 100 lb bales..lb.	.11	.13	.11	.13	.13	.11	.16	.12½
Borneo, Solid, 100 lb bale..lb.	.06½	08½	.06½	.08½	.08½	.06½	.08½	.08
Cyanamide, bulk c-1 wks Nitrogen unit.............	.....	1.39	.....	1.39	2.00	1.70	2.00	2.00
Dextrin, corn, 140 lb bags.100 lb.	3.47	3.67	3.47	4.02	4.82	4.42	4.92	4.62
White, 140 lb bags.....100 lb.	3.42	3.67	3.42	4.02	4.77	4.17	4.87	4.57
Potato, Yellow, 220 lb bgs..lb.	.08	.09	.08	.09	.09	.08	.09	.08
White, 220 lb bags 1c-1....lb.	.08	.09	.08	.09	.09	.08	.09	.08
Tapioca, 200 lb bags 1c-1...lb.	.08¼	.08¾	.08¼	.08¾	.08¼	.08	.08½	.08
Diamylphthalate, drs wks...gal.	.....	3.80	.....	3.80	3.80	3.80	3.80	3.80
Dianisidine, barrels.........lb.	2.35	2.70	2.35	2.70	2.70	2.35	3.10	2.70
Dibutylphthalate, wks.......lb.	.24½	.28	.24½	.28	.28	.24½	.26½	.26½
Dibutyltartrate, 50 gal drs....lb.	.29½	.31½	.29½	.31½	.31½	.29½	.31½	.29½
Dichloroethylether, 50 gal drs lb.	.....	.06	.....	.06	.07	.05	.13	.05
Dichloromethane, drs wks....lb.	.55	.65	.55	.65	.65	.55	.65	.55
Diethylamine, 400 lb drs.....lb.	2.75	3.00	2.75	3.00	3.00	2.75	3.00	2.75
Diethylcarbonate, drs ......gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Diethylaniline, 850 lb drs.....lb.	.55	.60	.55	.60	.60	.55	.60	.55
Diethyleneglycol, drs........lb.	.14	.16	.14	.16	.13	.10	.13	.10
Mono ethyl ether, drs....lb.	.....	.16	.....	.16	.16	.13	.15	.13
Mono butyl ether, drs....lb.	.24	.30	.24	.30	.30	.24	.30	.25
Diethylene oxide, 50 gal dr....lb.	.....	.50	.....	.50	.50	.50	.50	.50
Diethylorthotoluidin, drs.....lb.	.64	.67	.64	.67	.67	.64	.67	.64
Diethyl phthalate, 1000 lb drums.................lb.	.24	.26	.24	.26	.26	.24	.26	.24
Diethylsulfate, technical, 50 gal drums.................lb.	.30	.35	.30	.35	.35	.30	.35	.30
Dimethylamine, 400 lb drs...lb.	.....	2.62	.....	2.62	2.62	2.62	2.62	2.62
Dimethylaniline, 340 lb drs...lb.	.26	.28	.26	.28	.28	.26	.32	.26

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and 121,147 in 1928. The Montecatini and its subsidiaries produce approximately 65 per cent of the Italian output of copper sulfate. It is estimated that the Italian plant capacity for this commodity is 150,000 tons. The exceptionally dry summers of 1929 and 1930, the fall in the price of wine, and the fluctuations of the price of copper contributed to reduce consumption the last two years.

Copper—The metal market continued in a very quiet state throughout the first three weeks of April reflecting the sentiment of further inactivity in the usual consuming channels. Buyers are simply not interested at current prices and producers are unwilling to make any considerable concession. The price moved in very narrow limits, 9½—10c, with most of the sales being made at the higher figure. The export situation followed the domestic market very closely and sales were generally light. World production of copper in March totaled 136,655 tons, against 128,685 tons in February and 129,390 tons in January, according to American Bureau of Metal Statistics. United States copper production in March totaled 57,922 tons, comparing with 55,229 tons in February and 53,429 tons in January. World output of copper in March averaged 4,408 tons a day compared with 4 596 tons in February, 4,174 in January and 4,969 tons in March, 1930.

Copper Carbonate—Demand was fair in industrial lines and somewhat better from the agricultural sections. With the metal fluctuating within narrow limits the price varies little.

Cresylic Acid—Demand for both the domestic and the imported was light but no change in price was registered.

Dyes Synthetic—Dye demand was even better in the first weeks of April than it was in March. The textile and tanning industries were operating at longer hours and sales to the latter specially were encouraging. Prices were steady. Imports of synthetic dyes during March amounted to 218,844 pounds, which were valued at $208,333, according to a report made by the United States Tariff Commission and the Department of Commerce. Imports during the same month last year totaled 466,257 pounds and had a value of $399, 420. Total imports for the first three months of 1931 have been 853,096 pounds, valued at $742,326, as compared with 1,140,465 pounds, with a value of $970,032, imported during the corresponding period of 1930.

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Dimethylsulfate, 100 lb drs...lb.	.45	.50	.45	.50	.50	.45	.50	.45
Dinitrobenzene, 400 lb bbls...lb.	.15½	.16½	.15½	.16½	.16½	.15½	.16½	.15
Dintrochlorobenzene, 400 lb bbls...lb.	.13	.15	.13	.15	.15	.13	.15	.13
Dinitronaphthalene, 350 lb bbls ...lb.	.34	.37	.34	.37	.37	.34	.37	.34
Dinitrophenol, 350 lb bbls....lb.	.29	.30	.29	.30	.32	.31	.32	.31
Dinitrotoluene, 300 lb bbls...lb.	.16	.17	.16	.17	.18	.16	.19	.17
Diorthotolyguanidine, 275 lb bbls wks...lb.	.42	.46	.42	.46	.46	.42	.49	.42
Dioxan (See Diethylene Oxide)	.....	.....	.....	.....	...	.....	.....	.....
Diphenyl...lb.	.20	.40	.20	.40	.50	.20	.50	.40
Diphenylamine...lb.	.37	.38	.37	.38	.40	.38	.47	.40
Diphenylguanidine, 100 lb bbl lb.	.30	.35	.30	.35	.35	.30	.40	.30
Dip Oil, 25%, drums...lb.	.26	.30	.26	.30	.30	.26	.30	.26
Divi Divi pods, bgs shipmt..ton	28.00	29.00	28.00	35.00	46.50	35.00	57.00	46.50
Extract...lb.	.05	.05½	.05	.05½	.05½	.05	.05½	.05
Egg Yolk, 200 lb cases...lb.	.45	.51	.45	.58	.80	.72	.84	.77
Epsom Salt, tech, 300 lb bbls c-1 NY...100 lb.	1.70	1.90	1.70	1.90	1.90	1.70	1.90	1.70
Ether, USP, 600 lb. drs...lb.	.21	.28	.21	.28	.28	.21	.39	.38
Anhydrous, C.P. 300 lb. drs.lb.	.....	.40	.....	.40	.40	.40		
Ethyl Acetate, 85% Ester, ... tanks...lb.	.....	.08	.08	.088	.115	.085	.122	.108
drums...lb.	.09	.095	.09	.10	.158	.094	.129	.111
Anhydrous, tanks...lb.	.....	.119	.....	.119	.142	.119		
drums...lb.	.115	.121	.115	.121	.156	.115		
Acetoacetate, 50 gal drs...lb.	.65	.68	.65	.68	.68	.65	.68	.65
Benzylaniline, 300 lb drs...lb.	.88	.90	.88	.90	1.11	.88	1.11	1.05
Bromide, tech, drums...lb.	.50	.55	.50	.55	.55	.50	.55	.50
Carbonate, 90%, 50 gal drs gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Chloride, 200 lb. drums...lb.	.....	.22	.....	.22	.22	.22	.22	.22
Chlorocarbonate, cbys...lb.	.....	.30	.....	.30	.40	.30	.40	.35
Ether, Absolute, 50 gal drs..lb.	.50	.52	.50	.52	.52	.50	.52	.50
Furoate, 1 lb tins...lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Lactate, drums works...lb.	.25	.29	.25	.29	.29	.25	.35	.25
Methyl Ketone, 50 gal drs..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Oxalate, drums works...lb.	.45	.55	.45	.55	.55	.45	.55	.45
Oxybutyrate, 50 gal drs wks.lb.	.....	.30½	.....	.30½	.30½	.30½	.36	.30
Ethylene Dibromide, 60 lb dr .lb.	.....	.70	.....	.70	.70	.70	.70	.79
Chlorhydrin, 40%, 10 gal cbys. chloro. cont...lb.	.75	.85	.75	.85	.85	.75	.85	.75
Dichloride, 50 gal drums...lb.	.05	.07	.05	.07	.07	.05	.10	.05
Glycol, 50 gal drs wks...lb.	.25	.28	.25	.28	.28	.25	30	.25
Mono Butyl Ether drs wks.	.25	.27	.25	.27	.27	.23	.31	.23
Mono Ethyl Ether drs wks	.17	.20	.17	.20	.20	.16	.24	.16
Mono Ethyl Ether Acetate dr. wks...	.19½	.23	.19½	.23	.23	.19	.26	.19
Mono Methyl Ether, drs.lb.	.21	.23	.21	.23	.23	.19	.23	.19
Oxide, cyl...lb.	.....	2.00	.....	2.00	2.00	2.00		
Ethylidenaniline...lb.	.45	.47½	.45	.47½	.47½	.45	.65	.45
Feldspar, bulk...ton	15.00	20.00	15.00	20.00	25.00	15.00	25.00	20.00
Powdered, bulk works...ton	15.00	21.00	15.00	21.00	21.00	15.00	21.00	15.00
Ferric Chloride, tech, crystal 475 lb bbls...lb.	.05	.07½	.05	.07½	.07½	.05	.09	.05
Fish Scrap, dried, wks...unit	4.20&10	4.25&10	4.20&10	4.25&10	4.35&10	3.90&10	4.25&10	3.65&10
Acid, Bulk 7 & 3½% delivered Norfolk & Balt. basis...unit	.....	3.50&50	.....	3.50 & 50	3.50&50	3.20&50	4.00&50	3.50&50
Fluorspar, 98%, bags...	41.00	46.00	41.00	46.00	46.00	41.00	46.00	41.00
Formaldehyde								
Formaldehyde, aniline, 100 lb.	.....	.....	.....	....	.....	.....	.....	.....
drums...lb.	.37½	.42	.37½	.42	.42	.37½	.42	.37
USP, 400 lb bbls wks...lb.	.06	.07¾	.06	.07¾	.08	.06	.10	.08½
Fossil Flour...lb.	.02½	.04	.02½	.04	.04	.02½	.04	.02½
Fullers Earth, bulk, mines ..ton	15.00	20.00	15.00	20.00	20.00	15.00	20.00	15.00½
Imp. powd c-1 bags...ton	24.00	30.00	24.00	30.00	30.00	24.00	30.00	25.00
Furfural (tech.) drums, wks..lb.	.....	.10	.....	.10	.15	.10	.19½	.17
Furfuramide (tech) 100 lb dr..lb.	.....	.30	.....	.30	.30	.30	.30	.30
Furfuryl Acetate, 1 lb tins...lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Alcohol, (tech) 100 lb dr...lb.	.....	.50	.....	.50	.50	.50	.50	.50
Furoic Acid (tech) 100 lb dr...lb.	.....	.50	.....	.50	.50	.50	1.00	.50
Fusel Oil, 10% impurities ...gal.	.. ..	1.35	.....	1.35	1.35	1.35	1.35	1.35
Fustic, chips...lb.	.04	.05	.04	.05	.05	.04	.05	.04
Crystals, 100 lb boxes...lb.	.20	.22	.20	.22	.22	.20	.22	.20
Liquid, 50°, 600 lb bbls...lb.	.09	10	.09	.10	.10	.09	.10	.09
Solid, 50 lb boxes...lb.	.14	.16	.14	.16	.16	.14	.16	.14
Sticks...ton	25.00	26.00	25.00	26.00	26.00	25.00	26.00	25.00
G Salt paste, 360 lb bbls...lb.	.45	.50	.45	.50	.50	.45	.52	.45
Gall Extract...lb.	.18	.20	.18	.20	.20	.18	.21	.18
Gambier, common 200 lb cs...lb.	.06½	.07	.06½	.07	.07	.06	.07	.06
25% liquid, 450 lb bbls...lb.	.08	.10	.08	.10	.10	.08	.14	.08
Singapore cubes, 150 lb bg..lb.	.09½	.09	.09½	.09	.09	.08½	.09	.08½
Gelatin, tech, 100 lb cases...lb.	.45	.50	.45	.50	.50	.45	.50	.45
Glauber s Salt, tech, c-1 wks...100 lb.	1.00	1.70	1.00	1.70	1.70	1.00	1.70	.70
Glucose (grape sugar) dry 70-80° bags c-1 NY...100 lb.	3.24	3.34	3.24	3.34	3.34	3.24	3.34	3.20
Tanner's Special, 100 lb bags ...100 lb.	.....	3.14	.....	3.14	3.14	3.14	3.14	3.14
Glue, medium white, bbls ...lb.	.22	.24	.22	.24	.24	.20	.24	.20
Pure white, bbls...lb.	.25	.26	.25	.26	.26	.22	.26	.22
Glycerin, CP, 550 lb drs...lb.	.12½	.14½	.12½	.14½	.14½	.12½	.16	.13¼
Dynamite, 100 lb drs... lb.	.10	.10½	.10	.12¼	.12¼	.11	.12¼	.10¾
Saponification, tanks...lb.	.07	.07¼	.07	.07½	.08	.07½	.08¾	.07¼
Soap Lye, tanks...lb.	.06	.06½	.06	.07	.07½	.06¾	.07½	.06¾
Graphite, crude, 220 lb bgs...ton	15.00	35.00	15.00	35.00	35.00	15.00	35.00	15.00
Flake, 500 lb bbls...lb.	.06	09	.06	.09	.09	.06	.09	06
Gums								
Gum Accroides, Red, coarse and fine 140-150 lb bags...lb.	.03¾	.04¼	.03¾	.04¼	.04¼	.03¾	.04¼	.03
Powd, 150 lb bags...lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06½

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

Fertilizers — With the season at hand actual shipments of fertilizers and raw materials could not fail but to show some real improvement from the lethargy prevailing since the first of the year. Conditions varied in different parts of the country, the Southeast and the Northeast showing up favorably, while the middle west and southwest lagged behind. Of course in the regions where the drought was felt the sale of fertilizers has been very materially lowered. February imports of fertilizer materials approximated 55 per cent of those for February, 1930, and about 49 per cent of those for the same month in 1929, National Fertilizer Association has reported. Imports for the month totaled 141,421 tons, compared with 257,596 tons during February last year and 289,414 tons during the same month two years ago. For the three months, December, January, February, fertilizer imports were 58 per cent of the imports for the same three months of the previous season, and about 57½ per cent of the imports for the same period two years ago. Unusually large reductions were noted in receipts of calcium cyanamide, calcium nitrate, sodium nitrate and guano during the three months December-February, as compared with the same months of last season. Imports of ammonium sulfate for the three months totaled more than 25,000 tons compared with 1,400 tons taken in during the same months of last season and 15,727 tons imported during the same three months two seasons ago. Tankage imports during the three months totaled 8,692 tons compared with 4,644 tons imported during the same months last season and 4,202 tons imported during the identical months two seasons ago.

Glycerine — The refined grades continued to reflect the weak state of the crude. Soap lye was reduced on April 17 from 6⅛ to 6c. Stocks are still excessive and consumers are apparently unwilling to contract ahead for their requirements. Demand for the chemically pure was only fair.

Gum Arabic — The price range during April ran from 9¾ to 10c, depending upon the quantity and the seller. Sales were rather small with buyers only making necessary purchases for immediate needs. Total exports of gum arabic from the Anglo-Egyptian Sudan amounted to $4,903,800 in 1930, which represented an increase of 43 per cent over 1929. Great Britain was the leading purchaser of the 1930 shipments being the destination of 3,935 tons valued at $1,000,000. The

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Yellow, 150-200 lb bags....lb.	.18	.20	.18	.20	.20	.18	.20	.18
Animi (Zanzibar) bean & pea 250 lb cases............lb.	.35	.40	.35	.40	.40	.35	.40	.35
Glassy, 250 lb cases.......lb.	.50	.55	.50	.55	.55	.50	.55	.50
Asphaltum, Barbadoes (Manjak) 200 lb bags.............lb.	.09	.12	.09	.12	.12	.09	.12	.09
Egyptian, 200 lb cases.......lb.	.15	.17	.15	.17	.17	.15	.17	.15
Gilsonite Selects, 200 lb bags ....ton	58.00	65.00	58.00	65.00	65.00	58.00	65.00	58.00
Damar Batavia standard 136, lb cases..................lb.	.11½	.12	.11½	.13	.20	.14	.26	.22
Batavia Dust, 160 lb bags.....lb.	.05½	.06	.05½	.06	.11	.06	.11	.10¼
E Seeds, 136 lb cases.......lb.	.07	.07½	.07	.08	.13	.08	.17½	.15
F Splinters, 136 lb cases and bags..................lb.	.06½	.07	.06½	.07½	.13½	.07	.13½	.13
Singapore, No 1, 224 lb cases lb.	.13½	.14	.13½	.15	.24	.18½	.30½	.26
No. 2, 224 lb cases........lb.	.08½	.09	.08½	.10	.20½	.13	.24	.21½
No. 3, 180 lb bags.........lb.	.05	.05½	.05	.06	.11½	.07	.14	.10
Benzoin Sumatra, U. S. P. 120 lb cases..................lb.	.30	.33	.30	.34	.40	.33	.40	.38
Copal Congo, 112 lb bags, clean opaque................lb.	.16½	.17	.16	.17	.17	.16	.17	.14
Dark, amber.............lb.	.06	.07	.06½	.07½	.08	.07¾	.09	.08¾
Light, amber............lb.	.12½	.14	.12½	.14	.14	.12½	.14	.12½
Water white.............lb.	.37	.45	.37	.45	.45	.37	.36	.35
Mastic...................lb.	.50	.52	.48	.58	.65	.57	.65	.58
Manila, 180-190 lb baskets								
Loba A.................lb.	.11	.12	.11	.13	.17½	.13	.17½	.17
Loba B.................lb.	.09	.09½	.09	.10½	.16½	.13½	.16½	.15½
Loba C.................lb.	.08½	.09	.08½	.10	.14	.10	.14½	.13½
M A Sorts..............lb.	.05½	.06	.05½	.06½	.....	.....	.....	.....
D B B Chips.............lb.	.07	.07½	.07	.08	.....	.....	.....	.....
East Indies chips, 180 lb bags lb.	.05	.05½	.05	.05½	.11	.09	.11	.10
Pale bold, 224 lb cs......lb.	.15½	.16	.15½	.16	.21	.17½	.21	.20
Pale nubs, 180 lb bags....lb,	.08	.08½	.08	.09	.16	.12½	.16	15
Pontianak, 224 lb cases....								
Bold gen No 1.........lb.	.16	17	.16	.17	.21	.19	.23	.20
Gen chips spot.........lb.	.07	.08	.07	.08½	.15	.13½	.15	.14½
Elemi, No. 1, 80-85 lb cs...lb.	.10	.10½	.10	.12	.14	.12½	.14	.13½
No. 2, 80-85 lb cases.....lb.	.09½	.10	.09½	.11½	.13½	.12	.13½	.13
No. 3, 80-85 lb cases.....lb.	.08½	.09½	.08½	.11	.13	.11	.13	.12
Kauri, 224-226 lb cases No. 1	.43	.49	.43	.50	.57	.48	.57	.50
No. 2 fair pale..........lb.	.26	.27	.26	.29	.38	.32	.38	.35
Brown Chips, 224-226 lb cases...............lb.	.10	.12	.10	.12	.12	.10	.12	.10
Bush Chips, 224-226 lb. cases...............lb.	.28	.30	.28	.34	.40	.38	.40	.38
Pale Chips, 224-226 lb cases ....lb.	.19	21	.19	.22	.26	.24½	.26	.24½
Sandarac, prime quality, 200 lb bags & 300 lb casks...lb.	.18	.20	.18	.22	.40	.27	.72	.35
Helium, 1 lit. bot. ....lit.	.....	25.00	.....	25.00	25.00	25.00	.20	.17
Hematine crystals, 400 lb bbls lb.	.14	.18	.14	.18	.18	.14	.20	.14
Paste, 500 bbls............lb.	.....	.11	.....	.11	.11	.11	.11	.11
Hemlock 25%, 600 lb bbls wks lb.	.03	.03½	.03	.03½	.03½	.03	.03¾	.03
Bark....................ton	.....	16.00	.....	16.00	16.00	16.00	17.00	16.00
Hexalene, 50 gal drs wks......lb.	.....	.60	.....	.60	.60	.60	.60	.60
Hexamethylenetetramine, drs.lb.	.46	.50	.46	.50	.50	.46	.58	.48
Hoof Meal, fob Chicago....unit	.....	2.50	.....	2.50	3.75	2.50	4.00	3.75
South Amer. to arrive....unit	.....	2.70	.....	2.70	3.75	2.70	3.90	3.75
Hydrogen Peroxide, 100 vol, 140 lb cbys..................lb.	.21	.24	.21	.24	.26	.21	.26	.24
Hydroxyamine Hydrochloride lb.	.....	3.15	.....	3.15	3.15	3.15		
Hypernic, 51°, 600 lb bbls....lb.	.12	.15	.12	.15	.15	.12	.15	.12
Indigo Madras, bbls..........lb.	1.28	1.30	1.28	1.30	1.30	1.28	1.30	1.28
20% paste, drums.........lb.	.15	.18	.15	.18	.18	.15	.18	.15
Synthetic, liquid..........lb.	.....	.12	.....	.12	.12	.12	.12	.12
Iron Chloride, see Ferric or Ferrous								
Iron Nitrate, kegs...........lb.	.09	.10	.09	.10	.10	.09	.10	.09
Coml, bbls..........100 lb.	2.50	3.25	2.50	3.25	3.25	2.50	3.25	2.50
Oxide, English..........lb.	.10	.12	.10	.12	.12	.10	.12	.10
Red, Spanish...........lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02½
Isopropyl Acetate, 50 gal drs gal.	.85	.90	.85	.90	.90	.85	.90	.85
Japan Wax, 224 lb cases......lb.	.....	.10½	.09¾	.11	.15½	.11½	.18	.16
Kieselguhr, 95 lb bgs NY.......								
Brown...................ton	60.00	70.00	60.00	70.00	70.00	60.00	70.00	60.00
Lead Acetate, bbls wks...100 lb.	10.50	11.00	10.50	11.00	13.50	10.50	13.50	13.00
White crystals, 500 lb bbls wks...............100 lb.	11.50	12.00	11.50	12.25	14.50	11.50	14.50	14.00
Arsenate, drs 1c-1 wks.....lb.	.11	.13	.11	.14	.16	.13	.15	.13
Dithiofuroate, 100 lb dr....lb.	.....	1.00	.....	1.00	1.00	1.00		
Metal, c-1 NY........100 lb.	4.50	4.60	4.25	4.60	7.75	5.10	7.75	6.10
Nitrate, 500 lb bbls wks....lb.	.13	.14	.13	.14	.14	.13	.14	.14
Oleate, bbls..............lb.	.17½	.18	.17½	.18	.18	.17½	.18	.17½
Oxide Litharge, 500 lb bbls.lb.	.07½	.08	.07½	.08	.08¾	.08½	.08¾	.08½
Red, 500 lb bbls wks....lb.	.07¾	.08¼	.07¾	.08¼	.09¾	.08¾	.09¾	.09¾
White, 500 lb bbls wks...lb.	.07½	.08	.07½	.08	.09¾	.07½	.09¾	.09
Sulfate, 500 lb bbls wk...lb.	.06¾	.07	.06¾	.07	.08¾	.06¾	.08¾	.08½
Leuna saltpetre, bags c.i.f...ton	.....	57.60	.....	57.60	57.60	57.60	57.00	52.00
S. points c. i. f............ton	.....	57.90	.....	57.90	57.90	57.90	57.30	52.30
Lime, ground stone bags.....ton	.....	4.50	.....	4.50	4.50	4.50	4.50	4.50
Live, 325 lb bbls wks...100 lb.	.....	1.05	.....	1.05	1.05	1.05	1.05	1.05
Lime Salts, see Calcium Salts								
Lime-Sulfur soln bbls........gal.	.15	.17	.15	.17	.17	.15	.17	.15
Lithopone, 400 lb bbls 1c-1 wks ....lb.	.04¾	.05	.04¾	.05	.05¾	.04¾	.06¼	.05¾
Logwood, 51°, 600 lb bbls.....lb.	.07	.08	.07	.08	.08½	.07	.08½	.08½
Chips, 150 lb bags.........lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Solid, 50 lb boxes.........lb.	.12	.12½	.12	.12½	.12½	.12½	.12½	.12½
Sticks...................ton	24.00	26.00	24.00	26.00	26.00	24.00	26.00	24.00
Lower grades............lb.	.07½	.08	.07½	.08	.08	.07½	.08	.07½
Madder, Dutch.............lb.	.22	.25	.22	.25	.25	.22	.25	.22
Magnesite, calc, 500 lb bbl...ton	50.00	60.00	50.00	60.00	60.00	50.00	60.00	50.00

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

United States was second, purchasing 3,890 tons, valued at $949,000 followed by France and Germany whose purchases amounted to 3,307 tons valued at $765,700, and 3,059 tons valued at $726,800, respectively.

Intermediates—The market for intermediates presented a rather contradictory situation the demand for some being fairly active while others lagged behind. Shipments into consuming channels of aniline oil were very satisfactory whereas the demand for anthraquinone was only fair. Shipments of phthalic anhydride were in better volume than for some time past.

Japan Wax—In sympathy with the spectacular rise in Carnauba, Japan was increased twice in the first three weeks of the month, the present ruling figure being 10½c. The low state of local stocks brought about by the decline has made itself felt and stocks are said to be quite scarce with the probability of still higher prices.

Lead—The metal continued generally weaker in the first three weeks of April. Demand has tapered off considerably and buyers were withholding from making future commitments. World lead production in March came to 145,489 short tons according to American Bureau of Metal Statistics compared with 135,320 in February, 145,510 in January and 163,177 tons in March, 1930. Daily average in March was 4,693 tons compared with 4,833 tons in February and 4,694 in January. Following tables gives in short tons world production of lead accredited as much as possible to country of origin.

	Jan.	*Feb.*	*Mar.*
United States	43,405	39,464	41,775
Canada	13,287	11,845	12,659
Mexico	23,979	20,744	24,801
Peru	....	....	....
Germany	10,710	11,930	11,112
Italy	2,174	2,370	2,244
Spain & Tunis*	9,129	9,805	10,014
Europe, n. e. s. †	18,700	16,600	17,600
Australia	15,568	14,004	16,412
Burma	7,358	7,358	7,672
Elsewhere †	1,200	1,200	1,200
World's total	145,510	135,320	145,489
United States	43,405	39,464	41,775
Elsewhere	102,105	95,856	103,714

*Partial. *Estimated or partly estimated.

Metanitparatoluidin—Leading producers announced a reduction of 10c a lb. the new price being based on $1.40.

Methanol—Due to the sharp decline in ethyl alcohol, methanol was reduced 5c on April 2, the 95% grade now is quoted at 33c in drums, and 39c in barrels, and the 97% at 34c in drums, and 39c in barrels. The pure grade was unaffected, although it was felt in most quarters that some change in price would be made. Production of

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Magnesium								
Magnesium Carb, tech, 70 lb bags NY....lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06
Chloride flake, 375 lb. drs c-1 wks....ton	.....	36.00	.....	36.00	36.00	36.00	36.00	36.00
Imported shipment....ton	31.75	33.00	31.75	33.00	33.00	31.75	33.00	33.00
Fused, imp, 900 lb bbls NY ton	.....	31.00	.....	31.00	31.00	31.00	31.00	31.00
Fluosilicate, crys, 400 lb bbls wks....lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Oxide, USP, light, 100 lb bbls ....lb.	.....	.42	.....	.42	.42	.42	.42	.42
Heavy, 250 lb bbls....lb.	.....	.50	.....	.50	.50	.50	.50	.50
Peroxide, 100 lb cs....lb.	1.00	1.25	1.00	1.25	1.25	1.00	1.25	1.00
Silicofluoride, bbls....lb.	.09¾	.10¼	.09¾	.10¼	.10¼	.09¾	.10¼	.09¾
Stearate, bbls....lb.	.24	.26	.24	.26	.26	.25	.26	.25
Manganese Borate, 30%, 200 lb bbls....lb.	.....	.19	.....	.19	.19	.19	.24	.19
Chloride, 600 lb casks....lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½	.08
Dioxide, tech (peroxide) drs lb.	.03½	.06	.03½	.06	.06	.03½	.06	.04½
Ore, Powdered or granular..								
75-80%, bbls....lb.	.02½	.03	.02½	.03	.03	.02½	.03½	.02½
80-85%, bbls....lb.	.....	.03½	.....	.03½	.03½	.03½	.04½	.03¾
85-88%, bbls....lb.	.04	.04½	.04	.04½	.04½	.04	.05½	.04
Sulfate, 550 lb drs NY....lb.	.07	.08	.07	.08	.08	.07	.08½	.07
Mangrove 55%, 400 lb bbls...lb.	.03½	Nom.	.03½	Nom.	Nom.	.03½	Nom.	.03½
Bark, African....ton	25.50	26.00	25.50	29.75	33.00	29.75	35.00	30.00
Marble Flour, bulk....ton	14.00	15.00	14.00	15.00	15.00	14.00	15.00	14.00
Mercurous chloride....lb.	.....	2.05	.....	2.05	2.05	2.05	2.05	2.05
Mercury metal....76 lb flask	103.00	104.00	101.00	106.00	124.50	106.00	126.00	120.00
Meta-nitro-aniline....lb.	.67	.69	.67	.69	.69	.67	.74	.67
Meta-nitro-para-toluidine 200 lb. bbls....lb.	1.40	1.55	1.40	1.55	1.55	1.50	1.55	1.50
Meta-phenylene-diamine 300 lb. bbls....lb.	.80	.84	.80	.84	.84	.80	.90	.80
Meta-toluene-diamine, 300 lb bbls....lb.	.67	.69	.67	.69	.69	.67	.72	.67
Methanol								
Methanol, (Wood Alcohol),....								
95%....gal.	.33	.35	.33	.37	.48	.35	.65	.51
97%....gal.	.34	.39	.34	.43	.49	.39	.65	.53
Pure, Synthetic drums cars gal.	.....	.42½	.....	.42½	.50	.42½	.68	.53
Synthetic tanks....gal.	.....	.40½	.....	.40½	.50	.40½	.66	.54
Methyl Acetate, drums....gal.	.....	Nom.	.....	Nom.	Nom.	Nom.	.95	.95
Acetone,....gal.	.50	.55	50	.70	.77	.65	.85	.73
Anthraquinone,....lb.	.85	.95	.85	.95	.85	.70	.95	.85
Cellosolve, (See Ethylene Glycol Mono Methyl Ether)	.....	.....	.....	.....	.....	.....	.....	....
Chloride, 90 lb cyl....lb.	.45	.45	.45	.45	.45	.45	.60	.45
Furoate, tech., 50 gal. dr., .lb.	.....	.50	.....	.50	.50	.50	.50	.50
Mica, dry grd. bags wks....lb.	65.00	80.00	65.00	80.00	80.00	65.00	80.00	65.00
Wet, ground, bags wks....lb.	110.00	115.00	110.00	115.00	115.00	110.00	115.00	110.00
Michler's Ketone, kegs....lb.	.....	3.00	.....	3.00	3.00	3.00	3.00	3.00
Monochlorobenzene, drums see, Chorobenzene, mono....lb.								
Monomethylparaminosufate 100 lb drums....lb.	3.75	4.00	3.75	4.00	4.00	3.75	4.20	3.75
Montan Wax, crude, bags....lb.	.06	.07	.06	.07	.07	.06	.07	.06½
Myrobalans 25%, liq bbls....b	.03¾	.04¼	.03¾	.04¼	.04¼	.03¾	.04½	.03¾
50% Solid, 50 lb boxes....lb.	.05	.05½	.05	.05½	.05½	.05	.08½	.05
J1 bags....ton	34.00	35.00	34.00	35.00	41.00	34.00	43.00	40.00
J 2 bags....ton	19.50	20.00	19.00	22.50	26.50	19.75	40.00	26.50
R 2 bags....ton	18.25	18.50	18.75	20.00	27.50	19.00	34.00	27.50
Naphtha, v. m. & p. (deodorized) bbls....gal.	.17	.18	.17	.18	.16	.16	.18	.16
Naphthalene balls, 250 lb bbls wks....lb.	.03¾	.04¾	.03¾	.04¾	.05½	.03¾	.05½	.05½
Crushed, chipped bgs wks..lb.	.....	.04	.....	.04	.04½	.04	.04½	.04½
Flakes, 175 lb bbls wks....lb.	.....	.03¾	.....	.03¾	.05	.03¾	.05	.05
Nickel Chloride, bbls kegs....lb.	.18	.20	.18	.21	.21	.20	.24	.20
Oxide, 100 lb kegs NY....lb.	.37	.40	.37	.40	.40	.37	.40	.37
Salt bbl. 400 bbls lb NY...lb.	.10½	.13	.10½	.13	.13	.10½	.13	.13
Single, 400 lb bbls NY....lb.	.10½	.12	.10½	.12	.13	.10½	.13	.13
Metal ingot....lb.	.35	.35	.35	.....	.....	.....	.....	.....
Nicotine, free 40%, 8 lb tins, cases....lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Sulfate, 10 lb tins....lb.	.98½	1.20	.98½	1.20	1.20	.98½	1.20	.98½
Nitre Cake, bulk....ton	12.00	14.00	12.00	14.00	18.00	12.00	18.00	12.00
Nitrobenzene, redistilled, 1000 lb drs wks....lb.	.09	.09½	.09	.09½	.09½	.09	.10½	.09
Nitrocellulose, c-l-l-cl, wks...lb.	.25	.36	.25	.36	.36	.25	.36	.25
Nitrogenous Material, bulk..unit	2.15	2.50	2.15	2.70	3.40	2.50	4.00	3.40
Nitronaphthalene, 550 lb bbls.lb.	.....	.25	.....	.25	.25	.25	.25	.25
Nitrotoluene, 1000 lb drs wks.lb.	.14	.15	.14	.15	.15	.14	.15	.14
Nutgalls Aleppy, bags....lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16
Chinese, bags....lb.	.12	.13	.12	.13	.13	.12	.13	.12
Oak Bark, ground....ton	30.00	35.00	30.00	35.00	35.00	30.00	50.00	30.00
Whole....ton	20.00	23.00	20.00	23.00	23.00	20.00	23.00	20.00
Orange-Mineral, 1100 lb casks NY....lb.	.11¾	.13	.11¾	.13	.13	.11¾	.13½	.11¾
Orthoaminophenol, 50 lb kgs..lb.	2.15	2.25	2.15	2.25	2.25	2.15	2.25	2.15
Orthoanisidine, 100 lb drs....lb.	2.50	2.60	2.50	2.60	2.60	2.50	2.60	2.50
Orthochlorophenol, drums....lb.	.50	.65	.50	.65	.65	.50	.65	.50
Orthocresol, drums....lb.	.25	.25	.25	.25	.35	.18	.28	.18
Orthodichlorobenzene, 1000 lb drums....lb.	.07	.10	.07	.10	.10	.07	.10	.07
Orthonitrochlorobenzene, 1200 lb drs wks....lb.	.30	.33	.30	.33	.33	.30	.33	.30
Orthonitrotoluene, 1000 lb drs wk....lb.	.16	.18	.16	.18	.18	.16	.18	.16
Orthonitrophenol, 350 lb dr...lb.	.85	90	.85	.90	.90	.85	.90	.85
Orthotoluidine, 350 lb bbl 1c-1 lb.	.28	30	.25	.30	.30	.25	.30	.25

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

synthetic methanol during February, 1931, amounted to 1,492,329 gallons, as compared with 1,378,227 gallons in January, 1931, and 460,164 gallons in February, 1930. Monthly statistics for the period from January, 1930, to February, 1931, inclusive, on the production and stocks of synthetic methanol, based on data furnished the Bureau of the Census by the manufacturers of this product, are presented in the following table.

Year and month 1930	*Production*	*Stocks, end of month*
January	484,971	577,040
February	460,164	649,510
Total (2 mos.)	945,135	....
March	672,465	696,075
April	580,685	833,091
May	617,767	975,090
June	590,723	1,220,249
July	456,548	1,368,341
August	486,035	1,329,717
September	978,302	1,319,226
October	1,349,718	347,206
November	1,722,015	772,128
December	*1,628,584	*1,338,225
Total (year)	*10,027,977	....
1931		
January	1,378,227	1,553,808
February	1,492,329	1,704,129
Total (2 mos.)	2,870,556	....

*Revised.

Shipments of synthetic methanol during February amounted to 1,342,008 gallons, according to the Bureau of Census, compared with 1,162,644 gallons during January. Shipments for the two months totalled 2,504, 652 gallons, compared with 847,903 gallons shipped during the same two months last year.

Methyl Acetone—In sympathy with the decline in methanol and alcohol, methyl acetone was reduced, the new schedule being based on 50-52c a gallon in tanks.

Nickel Salt—The combination of the reduction recently placed in effect together with a definite improvement in the automative field caused a decided betterment in the demand from the plating field.

Potash—Shipments going into the southern sections were rather large, but deliveries to other parts of the country were restricted and below the same period last year. Considerable interest was being shown in what effect the present developments in American potash will have on the price structure. March loadings of the Potash Syndicate amounted to 1,790,000 doppelzentner, as compared with 1,880,000 doppelzentner in March, 1930. Loadings since May 1, 1930, totalled 11,500,000 doppelzentner, as compared with 13,230,000 doppelzentner in the same period of the previous year.

Sodium Bichromate—Second hands were reporting improvement in demand from both the textile and the tanning industries. The dry-color producers were taking fairly large tonnages against present

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Orthonitroparachlorphenol, tins ....lb.	.70	.75	.70	.75	.75	.70	.75	.70
Osage Orange, crystals.......lb.	.16	.17	.16	.17	.17	.16	.17	.16
51 deg. liquid............lb.	.07	.07½	.07	.07½	.07½	.07	.07½	.07
Powdered, 100 lb bags.....lb.	.14½	.15	.14½	.15	.15	.14½	.15	.14½
Paraffin, refd, 200 lb cs slabs								
123-127 deg. M. P.........lb.	.03¼	.03	.03¼	.03	.04⅛	.03¼	.06¾	.04⅝
128-132 deg. M. P.........lb.	.03½	.03¼	.03½	.03¼	.06⅜	.03½	.07	.04¾
133-137 deg. M. P. ....lb	.04⅜	.07¼	.04⅜	.07¼	.07½	.04⅜	.07¼	.06½
Para Aldehyde, 110-55 gal drs..lb.	.20½	.23	.20½	.23	.23	.20½	.28	.20½
Aminoacetanilid, 100 lb bg..lb.	.52	.60	.52	.60	1.05	.52	1.05	1.00
Aminohydrochloride, 100 lb kegs...lb	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Aminophenol, 100 lb keg...lb.	.84	.86	.84	.86	1.02	.92	1.15	.99
Chlorophenol, drums......lb.	.50	.65	.50	.65	.65	.50	.65	.50
Coumarone, 330 lb drums. lb.	.....	.....	.....	.....	.....	.....	.....	.....
Cymene, refd, 110 gal dr..gal.	2.25	2.50	2.25	2.50	2.50	2.25	2.50	2.25
Dichlorobenzene, 150 lb bbls wks...lb.	.17	.20	.17	.20	.20	.17	.20	.17
Nitroacetanilid, 300 lb bbls.lb.	.50	.55	.50	.55	.55	.50	.55	.50
Nitroaniline, 300 lb bbls wks ....lb.	.48	.55	.48	.55	.55	.48	.55	.48
Nitrochlorobenzene, 1200 lb drs wks...lb.	.23	.26	.23	.26	.26	.23	.26	23
Nitro-orthotoluidine, 300 lb bbls...lb.	2.75	2.85	2.75	2.85	2.85	2.75	2.85	2.75
Nitrophenol 185 lb bbls....lb.	.45	50	.45	.50	.50	.45	.55	.45
Nitrosodimethylaniline, 120 lb. bbls...lb.	.92	.94	.92	.94	.94	.92	.94	.92
Nitrotoluene, 350 lb bbls...lb.	.29	.31	.29	.31	.31	.29	.31	.29
Phenylenediamine, 350 lb bbls ....lb.	1.15	1.20	1.15	1.20	1.20	1.15	1.20	1.15
Tolueneulfonamide, 175 lb bbls...lb.	.70	.75	.70	.75	.75	.70	.75	.70
Toluenesulfonchloride, 410 lb bbls wks.....lb.	.20	.22	.20	.22	.22	.20	.22	.20
Toluidine, 350 lb bbls wk...lb.	.....	.44	.....	.44	.40	.38	.42	.38
Paris Green, Arsenic Basis								
100 lb kegs..........lb.	.....	.27	.....	.27	.27	.27	.27	25
250 lb kegs..........lb.	.....	.25	.....	.25	.25	.25	.25	.23
Persian Berry Ext., bbls.....lb.	.25	Nom.	.25	Nom.	Nom.	.25	25	.25
Pentasol (see Alcohol, Amyl)...								
Pentasol Acetate (see Amyl Acetate)								
Petrolatum, Green, 300 lb bbl.lb.	.02	.02¼	.02	.02¼	.02¼	.02	.02¼	.02
Phenol, 250-100 lb drums.....lb.	.14¼	.15	.14¼	.15	.15	.14¼	.16	.13
Phenyl-Alpha-Naphthylamine, 100 lb kegs...........lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Phenylhydrazine Hydrochloride ......lb.	2.90	3.00	2.90	3.00	3.00	2.90		

Phosphate

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Phosphate Acid (see Superphosphate)								
Phosphate Rock, f.o.b. mines								
Florida Pebble, 68% basis..ton	3.10	3.25	3.10	3.25	3.15	3.00	3.15	3.00
70% basis...........ton	3.75	3.90	3.75	3.90	4.00	3.75	4.00	3.50
72% basis...........ton	4.25	4.35	4.25	4.35	4.50	4.25	4.50	4.00
75-74% basis..........ton	5.25	5.50	5.25	5.50	5.50	5.25	5.50	5.00
75% basis...........ton	.....	5.75	.....	5.75	5.75	5.75	5.75	5.75
77-80% basis..........ton	.....	6.25	.....	6.25	6.25	6.25	6.25	6.25
Tennessee, 72% basis.....ton	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Phosphorous Oxychloride 175 lb cyl...........lb.	.18	.20	.18	.20	.25	.18	.40	.20
Red, 110 lb cases........lb.	.37½	.42	.37½	.42	.42	.37½	.60	.37½
Yellow, 110 lb cases wks..lb.	.31	.37½	.31	.37½	.37½	.31	.32	.31
Sesquisulfide, 100 lb cs.....lb.	.....	.44	.....	.44	.44	.44	.46	.44
Trichloride, cylinders......lb.	.18	.20	.18	.20	.25	.18	.35	.20
Phthalic Anhydride, 100 lb bbls wks...........lb.	.15	.16	.15	.16	.20	.15	.20	.18
Pigments Metallic, Red or brown bags, bbls, Pa. wks.....ton	37.00	45.00	37.00	45.00	45.00	37.00	45.00	37.00
Pine Oil, 55 gal drums or bbls								
Destructive dist..........lb.	.63	.64	.63	.64	.64	.63	.64	.63
Prime bbls..............bbl.	8.00	10.60	8.00	10.60	10.60	8.00	10.60	8.00
Steam dist. bbls..........gal.	.65	.70	.65	.70	.70	.65	.70	.65
Pitch Hardwood,.............. wks...........ton	35.00	45.00	35.00	45.00	45.00	35.00	45.00	40.00
Plaster Paris, tech, 250 lb bbls ....bbl.	3.30	3.50	3.30	3.50	3.50	3.30	3.50	3.30
Platinum, Refined..........oz.	27.00	28.00	27.00	28.00	.....	.....	.....	.....

Potash

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Potash, Caustic, wks, solid...lb.	.06¼	.06¾	.06¼	.06¾	.06¾	.06¼	.07¼	.06¼
flake...........lb.	.0705	08	.0705	.08	.08	.0705	.07½	.0705
Potash Salts, Rough Kainit								
12.4% basis bulk.......ton	.....	9.20	.....	9.20	9 20	9.10	9.10	9.00
14% basis.............ton	.....	9.70	.....	9.70	9 70	9.60	9.60	9.50
Manure Salts..................								
20% basis bulk.........ton	.....	12.65	.....	12.65	12.65	12.50	12.50	12.40
30% basis bulk.........ton	.....	19.15	.....	19.15	19.15	18.95	18.95	18.75
Potassium Acetate..........lb.	.28	.30	.28	.30	.30	.27		
Potassium Muriate, 80% basis bags.............ton	.....	37.15	.....	37.15	37.15	36.75	36.75	36.40
Pot. & Mag. Sulfate, 48% basis bags.............ton	.....	27.80	.....	27.80	27.80	27.50	27.50	27.00
Potassium Sulfate, 90% basis bags.............ton	.....	48.25	.....	48.25	48.25	47.75	47.75	47.30
Potassium Bicarbonate, USP, 320 lb bbls...........lb.	.09½	.10	.09½	.10	.10	.09¼	.14	.09½
Bichromate Crystals, 725 lb casks...........lb.	.08¾	.09½	.08¾	.09½	.09½	.08¾	.09½	.09
Powd., 725 lb cks wks....lb.	.13	.13½	.13	.13½	.13½	.13	.13½	.13

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

contracts. The price remained firm at 7-7½c.

Caustic Soda—Trading was restricted to relatively small quantities but with shipments on contract being in fair volume. Demands from the soap industry have shown an encouraging increase. According to official Russian sources the production of soda alkalies has been as follows:

	Soda Ash metric tons	*Caustic Soda metric tons*
1913	159,000	53,000
1926-27	171,000	51,437
1927-28	207,271	55,827
1928-29	229,992	63,805
1929-30	357,130	252,706

	Sodium bicarbonate metric tons
1913	7,000
1926-27	15,000
1927-28	14,000
1928-29	22,506
1929-30	67,145

Sodium Chlorate—The very firm position in this commodity continued with shipments now going forward against seasonal agricultural contracts in large volume. Prices remained unchanged and while no alteration is expected in the schedule for sometime it is thought that any change that does take place will be upward.

Quicksilver—The market in this commodity staged a mild rally during the past month and quotations were being based on $103-$104 a flask, a rise of $2 to $3 a unit. The increase was brought about by a lack of spot material on hand, due to the gradual drop and the lessening of importations into this country. The trend for the immediate future appears to be upward, or at least the market will hold at present levels according to the views of important factors in the market.

Rosin—Prices generally moved both in the primary and in the local markets within very close range during the first three weeks of April. Offerings in the primary centers were less than formerly and this had a very stabilizing influence on the market.

Salt Cake — Producers were holding larger stocks on hand than at any other period since the first of the year and some shading was reported on large tonnages. No further reduction is expected, however, as both the glass and paper industries were expected back in the market for large replacements very shortly. Germany's export of salt cake and niter cake during 1930 was 188,390 metric tons, compared with 177,374 in 1929 and 120,394 in 1928. The exports to Sweden increased from 11,463 metric tons in 1929 to 67,899 metric tons in 1930, while the exports to the United States decreased from 77,098 to 32,267 metric tons for the corresponding

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Binoxiate, 300 lb bbls......lb.	.14	.17	.14	.17	.17	.14	.17	.14
Bisulfate, 100 lb kegs......lb.	.....	.30	.....	.30	.30	.30	.30	.30
Carbonate, 80-85% calc. 800 lb casks..............lb.	.05⅝	.05¾	.05⅝	.05¾	.05¾	.05⅝	.05⅝	.05⅝
Chlorate crystals, powder 112 lb keg wks...........lb.	.08	.08½	.08	.08½	.09	.08	.09	.08½
Chloride, crys bbls.........lb.	.05½	.06	.05½	.06	.06	.05½	.05½	.05½
Chromate, kegs...........lb.	.23	.28	.23	.28	.28	.23	.28	.23
Cyanide, 110 lb. cases.....lb.	.55	.57½	.55	.57½	.57½	.55	.57½	.55
Metabisulfite, 300 lb. bbl...lb.	.12	.13	.12	.13	.13	.12	.13	.11
Oxalate, bbls.............lb.	.20	.24	.20	.24	.24	.20	.24	.16
Perchlorate, casks wks.....lb.	.11	.12	.11	.12	.12	.11	.12	.11
Permanganate, USP, crys 500 & 100 lb drs wks........lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16
Prussiate, red, 112 lb keg...lb.	.38	.40	.38	.40	.40	.38	.40	.38
Yellow, 500 lb casks.....lb.	.18½	.21	.18½	.21	.21	.18½	.21	.18½
Tartrate Neut, 100 lb keg..lb.	.....	.21	.....	.21	.21	.21	.51	.51
Titanium Oxalate, 200 lb bbls ....lb.	.21	.23	.21	.23	.23	.21	.25	.21
Propyl Furoate, 1 lb tins.....lb.	.....	5.00	.....	5.00	5.00	5.00	5.00	5.00
Pumice Stone, lump bags.....lb.	.04	.05	.04	.05	.05	.04	.05	.04
250 lb bbls.............lb.	.04½	.06	.04½	.06	.06	.04½	.06	.04½
Powdered, 350 lb bags.....lb.	.02½	.03	.02½	.03	.03	02½	.03	.02½
Putty, commercial, tubs..100 lb.	.....	.03½	.....	.03¼	.03½	.03½	.03½	.03½
Linseed Oil, kegs......100 lb.	.....	.05½	.....	.05½	.05½	.05½	.05½	.05½
Pyridine, 50 gal drums......gal.	1.50	1.75	1.50	1.75	1.75	1.50	1.75	1.50
Pyrites, Spanish cif Atlantic ports bulk.............unit	.13	.13¾	.13	.13¾	.13¾	.13	.13¾	.13
Quebracho, 35% liquid tks....lb.	.02¾	.04	.02¾	.04	.04	.02¾	.04	.03
450 lb bbls c-1..........lb.	.03½	.03¾	.03½	.03¾	.03¾	.03½	.04½	.03½
35% Bleaching, 450 lb bbl .lb.	.04½	.05½	.04¼	.05¼	.04½	.05½	.04½	.05½
Solid, 63%, 100 lb bales cif..lb.	.05	.05½	.05	.05½	.05½	.05	.05¾	.05½
Clarified, 64%, bales.....lb.	.....	.05⅝	.....	.05⅝	.05⅝	.05⅝	.05⅝	.05⅝
Quercitron, 51 deg liquid 450 lb bbls.................lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
Solid, 100 lb boxes.........lb.	.09½	.13	.09½	.13	.13	.09½	.13	.10
Bark, Rough...........ton	.....	14.00	.....	14.00	14.00	14.00	14.00	14.00
Ground................ton	34.00	35.00	34.00	35.00	35.00	34.00	35.00	34.00
R Salt, 250 lb bbls wks......lb.	.40	.44	.40	.44	.45	.40	.46	.44
Red Sanders Wood, grd bbls..lb.	.....	.18	.....	.18	.18	.18	.18	.18
Resorcinol Tech, cans........lb.	.90	1.25	.90	1.25	1.25	.90	1.25	1.15
Rosin Oil, 50 gal bbls, first run ....gal.	.54	.58	.56	.58	.58	.56	.62	.57
Second run............gal.	.60	.61	.59	.61	.61	.59	.64	.60

Rosin

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Rosins 600 lb bbls 280 lb...unit ex. yard N. Y.								
B........................	4.70	4.80	4.15	4.95	7.75	5.35	9.25	7.45
D........................	5.45	5.50	4.60	5.50	8.00	5.50	9.25	7.70
E........................	.....	5.95	4.85	5.90	8.17	5.52½	9.27	8.30
F........................	6.00	6.20	5.05	6.20	8.45	5.55	9.27	8.40
G........................	6.15	6.25	5.15	6.25	8.45	5.60	9.45	8.40
H........................	6.25	6.30	5.20	6.30	8.55	5.60	9.50	8.40
I........................	6.30	6.35	5.25	6.35	8.58	5.62½	9.50	8.40
K........................	6.35	6.45	5.40	6.45	8.65	5.62½	9.55	8.45
M........................	6.60	6.70	5.65	6.70	8.80	5.65	9.85	8.50
N........................	6.90	6.95	6.15	6.95	8.95	6.05	10.30	8.93
WG......................	.....	8.20	7.65	8.15	9.25	6.85	11.30	9.00
WW......................	8.85	8.90	8.40	8.90	9.85	7.85	12.30	9.30
Rotten Stone, bags mines....ton	24.00	20.00	24.00	20.00	30.00	18.00	30.00	24.00
Lump, imported, bbls......lb.	.05	.07	.05	.07	.07	.05	.08	.05
Selected bbls............lb.	.09	.12	.09	.12	.12	.09	.12	.09
Powdered, bbls...........lb.	.02	.05	.02	.05	.05	.02	.05	.02
Sago Flour, 150 lb bags......lb.	.04½	.05	.04½	.05	.05	.04½	.05	.04½
Sal Soda, bbls wks.......100 lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Salt Cake, 94-96% c-1 wks. .ton	15.50	19.00	15.50	19.00	24.00	15.50	24.00	19.00
Chrome ....ton	14.50	17.00	14.50	17.00	25.00	14.50	21.00	12.00
Saltpetre, double refd granular 450-500 lb bbls..........lb.	.06⅛	.06¾	.06⅛	.06¾	.06¾	.06⅛	.06½	.06⅛
Satin, White, 500 lb bbls.....lb	.....	.01½	.....	.01½	.01½	.01½	.01½	.01½
Shellac Bone dry bbls........lb.	.31	.33	.28	.29	.47	.28	.61	.47
Garnet, bags..............lb.	.22	.26	.24	.26	.40	.24	.45	.40
Superfine, bags............lb.	.20	.22	.19	.22	.39	.20	.47	.39
T. N. bags...............lb.	.18	.20	.....	.17	.34	.18	.44	.36
Schaeffer's Salt, kegs.........lb.	.53	.57	.53	.57	.57	.53	.57	.53
Silica, Crude, bulk mines....ton	8.00	11.00	8.00	11.00	11.00	8.00	11.00	8.00
Refined, floated bags......ton	22.00	30.00	22.00	30.00	30.00	22.00	30.00	22.00
Air floated bags........ton	.....	32.00	.....	32.00	32.00	32.00	32.00	32.00
Extra floated bags......ton	32.00	40.00	32.00	40.00	40.00	32.00	40.00	32.00
Soapstone, Powdered, bags f. o. b. mines.................ton	15.00	22.00	15.00	22.00	22.00	15.00	22.00	15.00

Soda

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Soda Ash, 58% dense, bags c-1 wks.................100 lb.	.....	1.17½	.....	1.17½	1.40	1.40	1.40	1.40
58% light, bags.......100 lb.	.....	1.15	.....	1.15	1.34½	1.34½	1.34½	1.34½
Contract, bags c-1 wks.100 lb.	.....	.....	.....	.....	1.32	1.32	1.32	1.32
Soda Caustic, 76% grnd & flake drums...............100 lb.	.....	2.90	.....	2.90	3.35	3.00	3.35	3.35
76% solid drs.........100 lb.	.....	2.50	.....	2.50	2.95	2.90	2.95	2.95
Sodium Acetate, tech....450 lb. bbls wks...............lb.	.04½	.05	.04½	.05	.05½	.04	.06¾	.04¾
Arsenate, drums..........lb.	.18	.19	.18	.19	.19	.18	.19	.18
Arsenite, drums..........gal.	.50	.75	.50	.75	1.00	.50	1.50	.75
Bicarb, 400 lb bbl NY..100 lb.	.....	.....	.....	.....	2.41	2.41	2.41	2.41

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

periods. It is estimated that the German production of this commodity is 350,000 metric tons annually.

Shellac Buyers—Appeared to be in somewhat of a quandary due to the erratic course of the market lately, but cables from abroad point to a conservative crop and this factor may cause a stiffening of prices or at least hold them at present levels for the time being.

Soda Ash—Trading in alkalies was very routine during the period under review. Spot sales were being made at the schedule prices. Tonnages in March were in better volume than in either January or February and compared quite favorably with the same month last year. The lower prices in effect since the end of the contract season were beginning to make themselves felt as the earning statements for the first quarter appeared during the last two weeks in April.

Superphosphate—Despite the fact that the market is now at the seasonal turn shipments were lower than was expected. Producers are holding fairly well to the price of $8 for the run of the pile with 50c a ton premium on guaranteed 16% material. Production for February, 1931 was 31.0 per cent less than for February, 1930. In the Northern Area production was 11.9 per cent less than for February, 1930 and for the Southern Area it was 45.7 per cent less than for February, 1930. Production for February, 1931 was 23.5 per cent less than for January, 1931. Production for February of last year was 21.5 per cent less than for the preceding month, January, 1930. Shipments to consumers, dealers, etc., for February, 1931 were 32.4 per cent less than for February, 1930. In the Northern Area the shipments varied less than one per cent from those of February, 1930, but in the Southern Area there was a decrease of 44.2 per cent in the February shipments as compared with those for February, 1930. Total shipments to consumers, dealers, etc., for February 1931 were 32.6 per cent smaller than for February, 1930. In the Northern Area there was a decrease of 27.9 per cent, while in the Southern Area the decrease amounted to 35.9 per cent. Stocks on hand February 28 were 2.3 per cent larger than on that date of 1930. In the Northern Area the stocks showed a decrease of less than one per cent, while in the Southern Area the stocks on hand on February 28 were slightly over 4 per cent of those on hand on February 29, 1930. Stocks on hand at the end of February, 1931 were approximately the same as the total on hand at the end of January, 1931—the actual figures showing a decrease for February of

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Bichromate, 500 lb cks wks.lb.	.07	.07½	.07	.07½	.07½	.07	.07¾	.07
Bisulfite, 500 lb bbl wks....lb.	.....	.04	.....	.04	.04	.04	.04	.04
Carb. 400 lb bbls NY..100 lb.	.....	2.30	.....	2.30	2.30	2.30	1.35	1.30
Chlorate, ... wks..lb.	.05¾	.07¾	.05¾	.07¾	.08	.05¾	.11	.06½
Chloride, technical........ton	12.00	13.00	12.00	13.00	13.00	12.00	13.00	12.00
Cyanide, 96-98%, 100 & 250 lb drums wks...........lb.	.16	.17	.16	.17	.20	.16	.20	.18
Fluoride, 300 lb bbls wks...lb.	.08¼	.08½	.08¼	.08½	.09	.08¼	.09	.08½
Hydrosulfite, 200 lb bbls f. o. b. wks.................lb.	.22	.24	.22	.24	.24	.22	.24	.22
Hypochloride solution, 100 lb cbys.................lb.	.....	.05	.....	.05	.05	.05	.05	.05
Hyposulfite, tech, pea cyrs 375 lb bbls wks......100 lb.	2.40	3.00	2.40	3.00	3.00	2.40	3.05	2.50
Technical, regular crystals 375 lb bbls wks....100 lb.	2.50	2.65	2.50	2.65	2.65	2.50	2.65	2.40
Metanilate, 150 lb bbls.... lb.	.44	.45	.44	.45	.45	.44	.45	.45
Monohydrate, bbls........lb.	.....	.02½	.....	.02½	.02½	.02½	.02½	.02½
Naphthionate, 300 lb bbl...lb.	.52	.54	.52	.54	.57	.52	.57	.54
Nitrate, 92%, crude, 200 lb bags c-1 NY......100 lb.	.....	2.07	2.02	2.07	2.22½	1.99	2.22½	2.09
Nitrite, 500 lb bbls spot....lb.	.07¼	.08	.07¼	.08	.08	.07¼	.08	.07½
Orthochlorotoluene, sulfonate, 175 lb bbls wks.......lb.	.25	.27	.25	.27	.27	.25	.27	.25
Oxalate Neut, 100 lb kegs..lb.	.37	.42	.37	.42	.42	.37	.42	.37
Perborate, 275 lb bbls.....lb.	.18	.20	.18	.20	.20	.18	.22	.18
Phosphate, di-sodium, tech. 310 lb bbls.......100 lb.	2.55	3.00	2.55	3.00	3.25	2.65	3.55	3.25
tri-sodium, tech, 325 lb bbls...............100 lb.	3.15	3.50	3.15	3.50	4.00	3.25	4.00	3.90
Picramate, 100 lb kegs.....lb.	.69	.72	.69	.72	.72	.69	.72	.69
Prussiate, Yellow, 350 lb bbl wks................lb.	.11½	.12	.11½	.12	12½	.11½	.12½	.12
Pyrophosphate, 100 lb keg..lb.	.15	.20	.15	.20	.20	.15	.20	.15
Silicate, 60 deg 55 gal drs, wks ....100 lb.	.....	1.65	.....	1.65	1.65	1.65	1.65	1.65
40 deg 55 gal drs, wks ....100 lb.	.75	1.00	.75	1.00	.80	.70	.80	.70
Silicofluoride, 450 lb bbls NY ....lb.	.04	.04¾	.04	.04¾	.05½	.04	.05½	.05
Stannate, 100 lb drums....lb.	.23½	.26	.23½	.26	.43	.24	.43	.38
Stearate, bbls.............lb.	.20	.25	.20	.25	.29	.20	.29	.25
Sulfanilate, 400 lb bbls.....lb.	.16	.18	.16	.18	.18	.16	.18	.16
Sulfate Anhyd, 550 lb bbls c-1 wks..............lb.	.02½	.02¾	.02½	.02¾	.02¾	.02½	.02¾	.02½
Sulfide, 80% crystals, 440 lb bbls wks.............lb.	.02½	.02¾	.02½	.02¾	.02¾	.02½	.02¾	.02½
62% solid, 650 lb drums lc-1 wks.............lb.	.03	.03¼	.03	.03¼	.03¼	.03	.04	.03¼
Sulfite, crystals, 400 lb bbls wks................lb.	.03	.03½	.03	.03¼	.03¼	.03	.03½	.03
Sulfocyanide, bbls.........lb.	.28	.35	.28	.35	.35	.28	.76	.28¾
Tungstate, tech, crystals, kegs ....lb.	.81	.88	.81	.88	.88	.81	1.40	.88
Solvent Naphtha, 110 gal drs wks..................gal.	.30	.38	.30	.38	.40	.30	.40	.35
Spruce, 25% liquid, bbls.....lb.	.....	.01¾	.....	.01¾	.01¾	.01¾	.01¾	.01¾
25% liquid, tanks wks.....lb.	.....	.01	.....	.01	.01	.01	.01	.01
50% powd, 100 lb bag wks lb.	.02	.02¼	.02	.02¼	.02¼	.02	.02¼	.02
Starch, powd., 140 lb bags ....100 lb.	.....	2.92	2.92	3.20	4.02	3.42	4.12	3.82
Pearl, 140 lb bags.....100 lb.	.....	2.82	2.82	3.00	3.92	3.32	4.02	3.72
Potato, 200 lb bags........lb.	.05½	.06	.05½	.06	.06¼	.05½	.06¾	.05¾
Imported bags..........lb.	.05¾	.06¼	.05¾	.06¼	.06¾	.05¾	.06¾	.05¾
Soluble................lb.	.08	.08½	.08	.08½	.08½	.08	.08½	08
Rice, 200 lb bbls..........lb.	.09	.10	.09	.10	.10	.09	.10	.09½
Wheat, thick bags.........lb.	.06½	.07	.06½	.07	.07	.06½	.07	.06½
Thin bags..............lb.	.09½	.10	.09½	.10	.10	.09½	.10	.09½
Strontium carbonate, 600 lb bbls wks....................lb.	.07½	.07½	.07½	.07½	.07½	.07½	.07½	.07½
Nitrate, 600 lb bbls NY....lb.	.09	.09½	.09	.09½	.09½	.09	.09½	.08¾
Peroxide, 100 lb drs.......lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25

Sulfur

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Sulfur Brimstone, broken rock, 250 lb bag c-1.......100 lb.	.....	2.05	.....	2.05	2.05	2.05	2.05	2.05
Crude, f. o. b. mines......ton	18.00	19.00	18.00	19.00	19.00	18.00	19.00	18.00
Flour for dusting 99½%, 100 lb bags c-1 NY....100 lb.	.....	2.40	.....	2.40	2.40	2.40	2.40	2.40
Heavy bags c-1......100 lb.	.....	2.50	.....	2.50	2.50	2.50	2.50	2.50
Flowers, 100%, 155 lb bbls c-1 NY...............100 lb.	.....	3.45	.....	3.45	3.45	3.45	3.45	3.45
Roll, bbls lc-1 NY.....100 lb.	2.65	2.85	2.65	2.85	2.85	2.65	2.85	2.65
Sulfur Chloride, red, 700 lb drs wks...................lb.	.05	.05½	.05	.05½	.05½	.05	.05½	.05
Yellow, 700 lb drs wks.....lb.	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03½
Sulfur Dioxide, 150 lb cyl....lb.	.07	.07½	.07	.07½	.07½	.07	.08½	.07
Extra, dry, 100 lb cyl......lb.	.10	.12	.10	.12	.12	.10	.19	.10
Sulfuryl Chloride,.........lb.	.15	.40	.15	.40	.65	.10	.65	.10
Talc, Crude, 100 lb bgs NY...ton	12.00	15.00	12.00	15.00	15.00	12.00	15.00	12.00
Refined, 100 lb bgs NY..ton	16.00	18.00	16.00	18.00	18.00	16.00	18.00	16.00
French, 220 lb bags NY...ton	18.00	22.00	18.00	22.00	22.00	18.00	25.00	18.00
Refined, white, bags....ton	35.00	40.00	35.00	40.00	40.00	35.00	45.00	35.00
Italian, 220 lb bags NY...ton	40.00	50.00	40.00	50.00	50.00	40.00	50.00	40.00
Refined, white, bags....ton	50.00	55.00	50.00	55.00	55.00	50.00	55.00	50.00
Superphosphate, 16% bulk, wks.................ton	8.00	9.00	8.00	9.00	9.50	8.00	10.00	9.00
Triple bulk, wks.........unit	.....	.65	.....	.65	.65	.65	.....	.....
Tankage Ground NY.......unit	.....	2.60&10	2.60	3.20&10	4.00&10	3.20&10	4.50&10	4.00&10
High grade f.o.b. Chicago.unit	.....	2.90&10	3.00	3.25&10	3.85&10	3.25&10	4.80&10	3.75&10
South American cif.......unit	.....	3.10&10	3.20	3.40&10	4.25&10	3.40&10	4 80&10	4.35&10
Tapioca Flour, high grade bgs.lb.	.03½	.05	.03½	.05	.05¾	.03	.05¾	.04¾
Medium grade, bags.....lb.	.03	.04	.03	.04	.04¾	.02½	.04¾	.03¾
Tar Acid Oil, 15%, drums....gal.	.24	.25	.24	.25	.27	.24	.27	.26
25% drums.............gal.	.26	.28	.26	.28	.30	.26	.30	.29

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

one-tenth of one per cent. During February of last year stocks decreased in the same ratio—the actual percentage being one-tenth of one per cent.

Tin Salts—On April 22 producers of tin crystals reduced the price to 25c from 25½c, and the tetrachloride to 18¼ from 18¾c. It was thought that a somewhat lessened demand from the silk-weighting centers combined with the unsteady position of the metal brought about the drop in the schedule.

Turpentine — Turpentine was higher during the month due to a net drop in the available stocks on hand at the primary centers. Actual sales were small, however, although a better note of inquiry was seen by some dealers.

OILS AND FATS

Chinawood Oil — Both the local market and on the coast, conditions were very quiet with a few inquiries, but with very little actual business being placed. Prices remained quite firm. Total imports of tung oil into the United States during February, 1931, amounted to 4,279,069 pounds, valued at $251,796, a substantial decrease compared with imports during February, 1930, totaling 9,622,844 pounds, valued at $1,112,668.

Cocoanut Oil—Stocks continue to be the stumbling block in any price advance movement. On sales where sizable quantities were involved some slight concessions were being made on the Coast. Local prices were firm during the period under review.

Cod Oil—While consumers were awaiting further developments in primary markets sales in local markets were in fairly large volume and established prices were held to in most instances.

Cottonseed Oil — The market in this commodity continued to be a very quiet affair with sales still restricted to immediate needs and little in the way of future commitments being entered into. The change in the rules of the exchange permitting trading in and delivery of prime summer yellow on contracts when specified became effective April 15. Generally speaking, the weather conditions were satisfactory in the various parts of the country. Cottonseed crushings for the eight months ended with March, totaled 4,407,486 tons, against 4,497,872 tons during the corresponding period last season, according to figures compiled by the United States Census Bureau. Receipts at mills were 4,563,996 tons, against 4,787,791 tons last season, and stocks on

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Terra Alba Amer. No. 1, bgs or bbls mills.........100lb.	1.15	1.75	1.15	1.75	1.75	1.15	1.75	1.15
No. 2 bags or bbls...100lb.	1.50	2.00	1.50	2.00	2.00	1.50	2.00	1.50¼
Imported bags............lb.	.01⅛	.01¾	.01⅛	.01¾	.01¾	.01⅛	.02½	.01
Tetrachlorethane, 50 gal dr...lb.	.09	.09½	.09	.09½	.09½	.09	.09½	.09
Tetralene, 50 gal drs wks.....lb.	.....	.20	.....	.20	.20	.20	.20	.20
Thiocarbanilid, 170 lb bbl....lb.	.26½	.28½	.26½	.28½	.28½	.22	.24	.22
Tin Bichloride, 50% soln, 100 lb bbls wks...............lb.	.....	.12¾	.....	.12¾	.12¾	.12¾	.14¾	.13½
Crystals, 500 lb bbls wks...lb.	.25	.26	.25	.28½	.34	.25	.38	.33
Metal Straits NY.........lb.	.....	.23¾	.23¾	.27	.38	.26	.48	.39
Oxide, 300 lb bbls wks.....lb.	.25	.29	.25	.29	.42	.25	.56	.42
Tetrachloride, 100 lb drs wks. ....lb.	.18¼	.18½	.. 18¼	.19½	.20½	.18¼	.30½	.27¼
Titanium Dioxide 300 lb bbl..lb	.21	.22	.21	.22	.50	.21	.50	.22
Pigment, bbls...........lb.	.06½	.07¾	.06½	.07¾	.07¾	.06½	.14	.07¼
Toluene, 110 gal drs........gal.	.....	.34	.....	.34	.40	.35	.45	.45
8000 gal tank cars wks....gal.	.28	.30	.28	.30	.35	.30	.40	.40
Toluidine, 350 lb bbls........lb.	.90	.94	.90	.94	.94	.90	.94	.90
Mixed, 900 lb drs wks.....lb.	.27	.32	.27	.32	.32	.27	.32	.31
Toner Lithol, red, bbls.......lb.	.90	.95	.90	.95	.95	.90	.95	.85
Para, red, bbls............lb.	.....	.80	.....	.80	.80	.80	.80	.70
Toluidine ....lb.	1.50	1.55	1.50	1.55	1.55	1.50	1.55	1.50
Triacetin, 50 gal drs wks.....lb.	.32	.36	.32	.36	.36	.32	.36	.32
Trichlorethylene, 50 gal dr...lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10
Triethanolamine, 50 gal drs...lb.	.40	.42	.40	.42	.42	.40	.60	.55
Tricresyl Phosphate, drs.....lb.	.33	.45	.33	.45	.45	.33	.45	.33
Triphenyl guanidine.........lb.	.58	.60	.58	.60	.60	.58	.70	.58
Phosphate, drums.........lb.	.60	.70	.60	.70	.70	.60	.75	.60
Tripoli, 500 lb bbls......100 lb.	.75	2.00	.75	2.00	2.00	1.75	2.00	1.75
Tungsten, Wolframite,..per unit	11.25	11.75	11.25	11.75	.....	.....	.....	.....
Turpentine carlots, bbls.....gal.	.54	.56½	.54	.56½	.61¼	.41	.65	.51¼
Wood Steam dist. bbls....gal.	.51	.61	.47	.61	.52	.36	.57	.49
Urea, pure, 112 lb cases......lb	.15	.17	.15	.17	.17	.15	.30	.15
Fert. grade, bags c.i.f.....ton	....	108.00	.....	108.00	108.00	108.00	105.00	98.00
c. i. f. S. points.........ton	.....	109.30	.....	109.30	109.30	109.30	106.30	99.30
Valonia Beard, 42%, tannin bags..................ton	.....	40.00	.....	40.00	40.00	39.50	55.00	42.00
Cups, 30-31% tannin.....ton	24.00	25.00	24.00	25.00	27.00	24.00	35.00	30.00
Mixture, bark, bags.......ton	30.00	31.00	30.00	31.00	32.50	30.00	43.00	35.00
Vermillion, English, kegs....lb..	1.75	1.80	1.75	1.80	2.05	1.75	2.05	2.00
Vinyl Chloride, 16 lb cyl.....lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Wattle Bark, bags..........ton	36.25	37.00	36.25	41.00	47.75	40.00	49.75	43.50
Extract 55%, double bags ex-dock..................lb.	.05⅞	.06½	.05⅞	.06½	.06½	.05⅞	.06½	.06½
Whiting, 200 lb bags, c-1 wks ....100 lb.	.....	1.00	.....	1.00	1.00	1.00	1.25	1.00
Alba, bags c-1 NY........ton	.....	13.00	.....	13.00	13.00	13.00	13.00	13.00
Gilders, bags c-1 NY...100 lb.	.....	1.35	.....	1.35	1.35	1.35	1.35	1.35
Xylene, 10 deg tanks wks. .gal.	.....	.28	.....	.28	.31	.28	.33	.33
Commercial, tanks wks...gal.	.25	.30	.25	.30	.33	.25	.32	.30
Xylidine, crude.............lb.	.....	.37	.....	.37	.38	.37	.38	.38

Zinc

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Zinc Ammonium Chloride powd., 400 lb bbls.........100 lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Carbonate Tech, bbls NY..lb.	.10½	.11	.10½	.11	.11	.10½	.11	.10½
Chloride Fused, 600 lb drs. wks..................lb.	.05¾	.06	.05¾	.06	.06	.05¾	.06	.05¾
Gran., 500 lb bbls wks.....lb.	.05⅜	.06	.05⅜	.06	.06½	.05⅜	.06½	.06¼
Soln 50%, tanks wks...100 lb.	2.25	3.00	2.25	3.00	3.00	2.25	3.00	3.00
Cyanide, 100 lb drums.....lb	.38	.39	.38	.39	.41	.38	.41	.40
Dithiofuroate, 100 lb dr....lb.	.....	1.00	.....	1.00	1.00	1.00	1.00	1.00
Dust, 500 lb bbls c-1 wks...lb.	.06	.07	.06	.07	.11	.06	.08¾	.08½
Metal, high grade slabs c-1 NY................100 lb.	3.70	3.9	3.70	4.45	6.45	4.10	6.45	6.45⅜
Oxide, American bags wks..lb.	.06½	.07	.06½	.07	.07⅜	.06½	.07⅜	.07
French, 300 lb bbls wks...lb.	.09⅜	.11⅜	.09⅜	.11⅜	.11⅜	.09⅜	.11⅜	.09⅜
Perborate, 100 lb drs......lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Peroxide, 100 lb drs.......lb.	.....	1.25	.....	1.25	1.25	1.25	1.25	1.25
Stearate, 50 lb bbls........lb.	.19	.22	.19	.23	.26	.20	.26	.25
Sulfate, 400 bbl wks.......lb.	.03	.03½	.03	.03½	.03½	.03	.03¾	.03
Sulfide, 500 lb bbls........lb.	.16	.16½	.16	.16½	.32	.16	.32	.30
Sulfocarbolate, 100 lb keg..lb.	.28	.30	.28	.30	.30	.28	.30	.28
Zirconium Oxide, Nat. kegs...lb.	.02½	.03	.02½	.03	.03	.02½	.03	.02½
Pure kegs................lb.	.45	.50	.45	.50	.50	.45	.50	.45
Semi-refined kegs..........lb.	.08	.10	.08	.10	.10	.08	.10	.08

Oils and Fats

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Castor, No. 1, 400 lb bbls.....lb.	.11¼	.12	.11¼	.12	.13½	.11½	.13½	.13
No. 3, 400 lb bbls.........lb.	.11¼	.11¾	.11¼	.11¾	.13	.11	.13	.12½
Blown, 400 lb bbls........lb.	.13¾	.14	.13¾	.14	.15	.12	.15	.14
China Wood, bbls spot NY...lb.	.07	.07½	.07	.07½	.13	.07	.16	.14½
Tanks, spot NY.........lb.	.06½	.07	.06	.07	.11⅜	.06	.15	.13½
Coast, tanks, ...lb.	.06	.06½	.05½	.06½	.10⅞	.05½	.14¼	.12½
Cocoanut, edible, bbls NY....lb.	.....	.10¾	.....	.10¾	.10¾	.10¾	.10¾	.10¾
Ceylon, 375 lb bbls NY....lb.	.06⅛	.06½	.06⅛	.06½	.08¼	.06⅜	.09½	.07⅞
8000 gal tanks NY......lb.	.05	.05⅛	.05½	.06	.07	.05½	.08⅜	.06⅝
Cochin, 375 lb bbls NY....lb.	.06¾	.07	.06¾	.07	.09¼	.07¼	.10	.09¾
Tanks NY...............lb.	.05⅝	.05¾	.05⅝	.05¾	.08½	.07	.09¼	.08¾
Manila, bbls NY...........lb.	.06⅛	.07	.06⅛	.07	.08¼	.06½	.09½	.07⅞
Tanks NY..............lb.	.05	.05⅛	.04¾	.05⅛	.07⅛	.05⅜	.08⅜	.06⅞
Tanks, Pacific Coast.....lb.	.04⅝	.04¾	.04½	.05	.07	.05⅛	08	.06⅜

Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1930 Average $1.161 - Jan. 1930 $1.072 - April 1931 $1.33

hand March 31 were 206,926 tons, against 330,052 tons on the same date last year. Manufacture of cotton-seed products during the period from August 1, 1930, to March 31 this year, the report showed, included 1,339,648,820 pounds of crude oil, against 1,399,538,041 pounds in the same period last season; 1,162,247,272 pounds of refined oil, against 1,168,352,161 pounds; 2,011,236 tons of cake and meal, against 1,998,198 tons; 1,218,472 tons of hulls, against 1,241,151 tons; 767,142 running bales of linters, against 927,601 bales; 46,345 500-pound bales of hull fiber, against 60,012 bales, and 32,124 500-pound bales of grabbots, motes, etc., against 40,360 bales.

Corn Oil—Offerings of crude were in larger volume with the result that there was a slight weakening of prices in tank car lots.

Degras—Trading continued to run along in a very limited way, sales inquiries being light. Stocks on hand remain about the same as last month.

Linseed Oil—A steady tone prevailed in the primary markets and prices moved within very narrow limits during the month. Shipments were moving into consuming channels at a rather fair pace and some decrease in stocks on hand was reported. In the flaxseed markets prices also moved within very narrow limits. The crop report from the northwest was felt to be favorable. It is too early, however, to obtain any accurate information on the size of the crop.

Menhadan Oil—Inquiry for future delivery was better and a firm tone appeared in the market. Generally speaking the situation is much better in the fish oils than in the vegetable oils.

Olive Oil—The soap interests were reported as being more active in the market for foots, but aside from this little new developed during the month. Prices were unaltered.

Palm Oil—The easy tone that has characterized this market continued to rule during April. Slight concessions were again being made whenever fairly large tonnage was involved.

Perilla Oil—Both buyers and sellers were holding off awaiting further advices from abroad. What sales were made locally were at unchanged prices.

Oleo Oil—Actual purchasing was restricted to small lots and to sales for export. Prices were fairly firm.

Soybean—The market had a distinct undertone of steadiness despite rather light demand from consuming centers.

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Cod, Newfoundland, 50gal bbls ...gal.	.41	.44	.41	.44	.56	.46	.64	.57½
Tanks NY ...gal.	.39	.40	.39	.40	.62	.48	.60	.60
Cod Liver see Chemicals ...								
Copra, bags ...lb.	.0275	.0275	.0255	.0325	.046	.039	.05½	.042
Corn, crude, bbls NY ...lb.	.....	.09	.....	.09	.10	.08¼	.10¾	.09¼
Tanks, mills ...lb.	.07⅜	.07½	.07	.07½	.08	.06½	.09¾	.07⅞
Refined, 375 lb bbls NY ...lb.	.10¼	.10½	.10¼	.10½	.10½	.09½	.11¾	.10½
Tanks ...lb.	.08½	.08¾	.08¼	.08¾	.10	.08	.11	.09
Cottonseed, crude, mill ...lb.	.06⅞	.07	.06⅛	.07	.07½	.06⅛	.09	.08⅛
PSY 100 lb bbls spot ...lb.	.08	.09	.074	.09	.088	.076	.1075	.085
Mar ...lb.	.....	.0748	.....	....	....	....	.....	....
Degras, American, 50 gal bbls NY ...lb.	.04½	.04½	.04	.04¼	.04½	.03½	.05	.03½
English, brown, bbls NY ...lb.	.04½	.05	.04¼	.05	.05	.04½	.05⅜	.04½
Light, bbls NY ...lb.	.05	.05½	.05	.05½	.05½	.05	.05¾	.05
Dog Fish, Coast Tanks ...gal.	.....	.32	.....	32	.34	.32		

Greases

	Current Market		1931 Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Greases, Brown ...lb.	.04⅛	.04¼	.03⅞	.04¼	.06½	.04	.08½	.06
Yellow ...lb.	.04½	.05	.03	.05	.07½	.03⅞	.08½	.06½
White, choice bbls NY ...lb	.05½	.05¾	05	.05¾	.08½	.06	.11¼	.07½
Herring, Coast, Tanks ...gal.	.....	Nom.	.....	Nom.	.....	.....		
Horse, bbls ...lb.	.05¼	Nom.	.05¼	Nom.	Nom.	.05¼	Nom.	.....
Lard Oil, edible, prime ...lb.	.12½	.13	.12½	.13	.13½	.12½	.15¾	.14⅜
Extra, bbls ...lb.	.09	.10	.09	.10	.12	.10	.13½	.12
Extra No. 1, bbls ...lb.	.08½	.09¾	.08½	.09¾	.11	.09¾	.13¼	.11¾
Linseed, Raw, five bbl lots ...lb.	098	.102	.096	.102	.146	.096	.162	.105
Bbls c-1 spot ...lb.	.092	.098	.092	.098	.142	.092	.158	.101
Tanks ...lb.	.086	.092	.086	.092	.134	.086	.15	.093
Menhaden Tanks, Baltimore ...gal.	.21	.22	.21	.22	.50	.21	.52	.45
Blown, bbls NY ...lb.	.07½	.08	.07½	.08	.09	.07½	.09	.09
Extra, bleached, bbls NY ...gal.	.47	.49	.52	.53	.70	.52	.70	.70
Light, pressed, bbls NY ...gal.	.36	.38	.36	.38	.64	.36	.64	.63
Yellow, bleached, bbls NY ...gal.	.39	.41	.38	.40	67	.38	.67	.66
Mineral Oil, white, 50 gal bbls ...gal.	.40	.60	.40	.60	.60	.40	.60	.40
Russian, gal ...gal.	.95	1.00	.95	1.00	1.00	.95	1.00	.95
Neatsfoot, CT, 20° bbls NY ...lb.	.15	.16	.15	.16	.17⅜	.16¼	.19	.18¼
Extra, bbls NY ...lb	.08¾	.10	.08¾	.10	.11⅛	.09½	.13½	.12
Pure, bbls NY ...lb.	.10¾	.12	.10¾	.12	.13⅛	.11½	.15¼	.13½
Oleo, No. 1, bbls NY ...lb.	.07½	.08	.07½	.08	.12½	.08⅞	.11½	.10¾
No. 2, bbls NY ...lb.	.06½	.08	.06½	.08	.11	.08⅛	.11½	.10
No. 3, bbls NY ...lb.	.08	.09	.08	.09	.10½	.09	.10½	.09¾
Olive, denatured, bbls NY ...gal.	.82	.85	.82	.85	1.00	.70	1.40	1.05
Edible, bbls NY ...gal.	1.75	2.00	1.75	2.00	2.00	1.75	2.00	1.95
Foots, bbls NY ...lb.	.06½	.06¾	.06½	.06¾	.08	.06	.11⅛	.08⅛
Palm, Kernel, Casks ...lb.	.06	.06¼	.05¾	.06¼	.08¼	.06	.09	.08
Lagos, 1500 lb casks ...lb.	.05	.06	.05	.06	.07¾	.05¾	.09	.07½
Niger, Casks ...lb.	.04½	.05¼	.04½	.05¼	.07½	.05⅛	.08¾	.07
Peanut, crude, bbls NY ...lb.	.....	Nom.	.....	Nom.	Nom.	.....	Nom.	.....
Refined, bbls NY ...lb.	.12	.14	.12	.14	.15	.12	.15	.14½
Perilla, bbls NY ...lb.	.09	.11	.09	.11	.14½	.10	.20	.15
Tanks, Coast ...lb.	.06½	.07	.06½	.09	.11¼	.08	.15⅜	.13
Poppyseed, bbls NY ...gal.	1.70	1.75	1.70	1.75	1.75	1.70	1.75	1.70
Rapeseed, blown, bbls NY ...gal.	.71	.73	.71	.73	1.00	.74	1.04	1.04
English, drms. NY ...gal.	.....	.75	.....	.75	.82	.75	.90	.82
Japanese, drms. NY ...gal.	.56	.58	.56	.58	.70	.56	.88	.72
Red, Distilled, bbls ...lb.	.08⅜	.09	.08⅜	.09	.10⅜	.08⅝	.11⅝	.10⅛
Tanks ...lb.	.07½	.08¼	.07½	.08¼	.09¼	.07¾	.10¼	.09½
Salmon, Coast, 8000 gal tks ...gal.	.....	.22	.22	.22	.44	.42	.44	.42
Sardine, Pacific Coast tks ...gal.	.18	.19	.18	.19	.42	.18	.51	.45
Sesame, edible, yellow, dos ...lb.	.09½	.10¾	.09½	.10¾	.12	.09	.12	.11½
White, dos ...lb.	.....	.12	.10	.12	.12½	.10	.12½	.12½
Sod, bbls NY ...gal.	.....	.40	.....	.40	.40	.40	.40	.40
Soy Bean, crude ...								
Pacific Coast, tanks ...lb.	.07	.08	.07	.08	.09¼	.07	.10⅞	.09
Domestic tanks, f.o.b. mills, ...lb.	.065	.07	.065	.07	.08⅛	.07	.10½	.08¼
Crude, bbls NY ...lb.	.073	.08	.073	.08	.10¾	.10	.12¾	.11¼
Tanks NY ...lb.	.074	.08	.074	.08	.09¾	.09	.11½	.10¼
Refined, bbls NY ...lb.	.08	.09	.08	.09	.13½	.13	.13½	.13¼
Sperm, 38° CT, bleached, bbls NY ...gal.	.84	.85	.84	.85	.85	.84	.85	.84
45° CT, bleached, bbls NY gal.	.79	.80	.79	.80	.80	.79	.80	.79
Stearic Acid, doubie pressed dist bags ...lb.	.09½	.11	.09½	.11	.15	.13½	.18½	.15½
Double pressed saponified bags ...lb.	.10½	.12	.10½	.12	.15½	.14½	.19	.15¾
Triple, pressed dist bags ...lb	.12	.14	.12	.14	.17	.15½	20½	.17¾
Stearine, Oleo. bbls ...lb.	.09	.08¾	.08¼	.08¾	.09½	.08¼	.12	.09¾
Tallow City, extra loose ...lb.	.04¾	.04	.03¾	.04	.07⅜	.04¾	.08⅜	.07
Edible, tierces ...lb.	.05½	.05	.04⅞	.06	.09¼	.05½	.10½	.08
Tallow Oil, Bbls, c-1 NY ...lb.	.07⅞	.08¾	.07⅞	.08¾	.11	.08½	.12	.10¾
Acidless, tanks NY ...lb.	.07⅞	.09	.07⅞	.09	.10	.08¼	.11	.09¾
Vegetable, Coast mats ...lb.	.06	Nom.	.06½	Nom.	Nom.	.06½	Nom.	.08
Turkey Red, single bbls ...lb.	.09	.10	.09	.10	.12	.10	.12	.11
Double, bbls ...lb.	.10	.12	.12	.10	.16	.13	.16	.14
Whale, bleached winter, bbls NY ...gal.	.....	.74	.....	.74	.74	.74	.80	.74
Extra, bleached, bbls NY ...gal.	.77	.77½	.77	.77½	.76	.76	.82	.76
Nat. winter, bbls NY ...gal.	.71	.72	.71	.72	.73	.73	.78	73

Index to Advertisers

"We"—Editorially Speaking

Edward J. Mechling may not be so widely known in strictly chemical circles as Brother Ben, but he has a big place all his own in horticulture and in the civic life of South Jersey. He is a big fruit grower; a capital authority on insecticides; a public figure, and bank director. Recently he delivered himself of so sane a statement on the farm problem that his warning to city workers not to go back to the farm drew editorial comments from half a dozen big newspapers. Incidently, he quite unwittingly revealed the secret of success of the modest—as such things go nowadays—chemical operations of the Mechling firm. A high degree of specialization—backed by expert knowledge—working a restricted territory intensively. All this is a pretty object lesson in these days of stalled mass production.

We once witnessed a demonstration of the extent of color-blindness existing even among those who are supposed to be perfectly normal. The colors used were varying shades of blue and green, and there comes a point when it is impossible for many people to differentiate between them. Yet green is a color usually employed to denote safety, and blue has come to represent despondency. So it is with business conditions, specially at a time, when one can blow hot or blow cold and find plenty of substantiating proof. Here are a couple of "green lights" shown at the recent A. C. S. meeting. The first was the report of the Employment Committee which reported only 1½ per cent of the American Chemists idle and the other, the finding of the A. C. S. statistican:

"Chemicals have thus fared comparatively well in the trying times through which the whole world has been passing, and they now occupy a favorable position for taking advantage of the revival to which the business public looks forward. The foreign trade figures provide a good barometer showing how well the industry has weathered this protracted adversity."

We once had an old general chemistry teacher whose pet expression, was, "The idea is grand, but how about doing it ?" Professor W. T. Read had both a grand idea and the ability and will to carry it to completion. Several professors of chemistry and chemical engineering saw possibilities in bringing the student to the Chemical Exposition. Read was one of these. He saw further than this, however, and today mainly through his breadth of vision, combined with a lot of real hard plugging, he has made the Student Courses at the Exposition one of its features. At first he encountered a great deal of opposition from many different sources. Several of the exhibitors assumed, what time has now proven to be a short-sighted viewpoint, when they insisted that the student be excluded. Read in his fight had the loyal support of the Exhibition Management. The length of the program that he has arranged for the 13th Exposition, the men of the industry who have consented to speak, and the subjects they have chosen are ample vindication of the soundness of his original idea. Without meaning to be facetious we feel that a very large portion of the industry would profit greatly by attending several of the lectures to be given in the advanced section.

Not long since the Director of Research of one of our biggest chemical mergers slipped out into the Middle West to look over the alleged research department of one of their recently amalgamated subsidiaries—an ancient and honorable little company with a sweet business in several standard chemicals. Doctor Director didn't expect to find much original research going on and he wasn't disappointed—but he did find two men. To each he gave a cheque for one thousand dollars and told them to go off visiting plants—any kind of plants from a sulfur mine to a perfume factory—for six weeks. Off they went. Back they came, both with half a dozen ideas—the first in years. Such a combination of common sense and vision is just what has made this research director famous.

Reading the very complete reports of the recent meeting of stockholders of the I. C. I., in British chemical magazines, one cannot but compare the keen interest of the Britisher with the indifference that the average American shows in meetings of companies in which he is financially interested. One of our most difficult jobs is obtaining sufficient proxies from indifferent stockholders so that meetings of companies may be held. Thomas F. Woodlock writing in the *Wall St. Journal* says that "Faith in the Management" is the most favorable interpretation that can be placed on this characteristic American trait. He points out correctly that there are very few instances in this country of stockholders rising up and taking control.

The holder of an odd share lot of I. C. I. is made welcome at the annual stockholders meeting. It is obviously a good idea for stockholders to go to their meetings personally to hear what is going on, and to meet face to face the men who are directing the activities of their companies. We could very well emulate this custom. We have a notion that unless conditions improve in many large nationally known companies, that the "Faith in Management" will not last and stockholders will begin to ask questions.

COMING FEATURES

"Wood Preservation," P. R. Hicks of the National Lumber Manufacturer's Association describes the best chemical methods for the Treatment of lumber.

Professor Charles E. Mullin whose series of articles on the Synthetic Yarn industry ends in this issue has undertaken a very comprehensive study of the synthetic acetic acid industry. He is well qualified through actual contact with the industry to write authoratatively on the subject.

In the Plant Management Section L. Staniforth concludes his series of articles on Costing, E. J. Burnell, Sales Manager, Link-Belt writes on "How Materials are Handled in the Chemical Industry."

A few of the timely subjects that will be covered shortly are: "An Up To The Minute Review, of the Sulfur Industry," "What The Microphone Can Do For Chemicals," "Stoneware In The Chemical Plant", and, "Synthetic Resins."

BY-PRODUCTS

"The latest atom, we understand, is to be thought of as a hole in the vast ocean of nothingness," says the New York *Times*, commenting on the new theories of the atom which crowd one another in the popular science of the day. "If you can't visualize an ocean of nothingness punctuated with holes, it's all right—next week there will be a new kind of atom."—*Chemistry and You.*

CHEMICAL MARKETS

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No. 4 of a series of advertisements tracing the development and uses of modern chemicals

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Sir Humphry Davy's lecture hall at the Royal Institution, London, where an admission fee of twenty pounds was paid to see sodium produced by the electrolytic process. (Reproduced from "Famous Chemists" by Tilden with permission of the publishers, E. P. Dutton & Co., Inc.)

Sir Humphry Davy (1778-1829) whose research in alkalis enabled him to produce sodium by electrolysis.

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Also, included among the important caustic users are the paper mills who buy 42,000 tons a year. The textile industry needs about 30,000 tons annually for cotton processing and mercerizing. Farther down the list are leather tanning, rubber reclaiming, vegetable oil refining, lye making and the preparation of pharmaceuticals and medicines, all of which consume considerable quantities.

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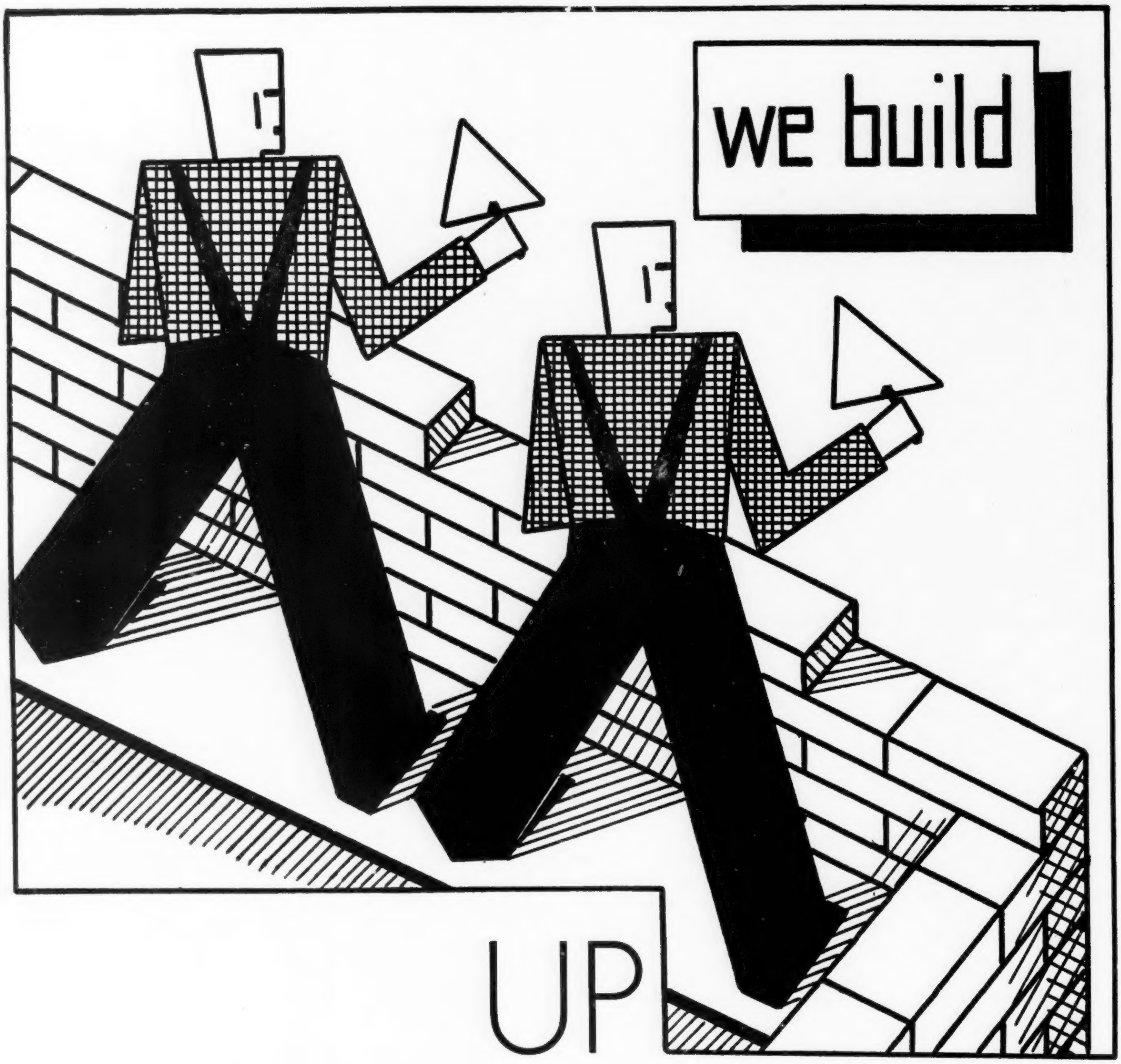

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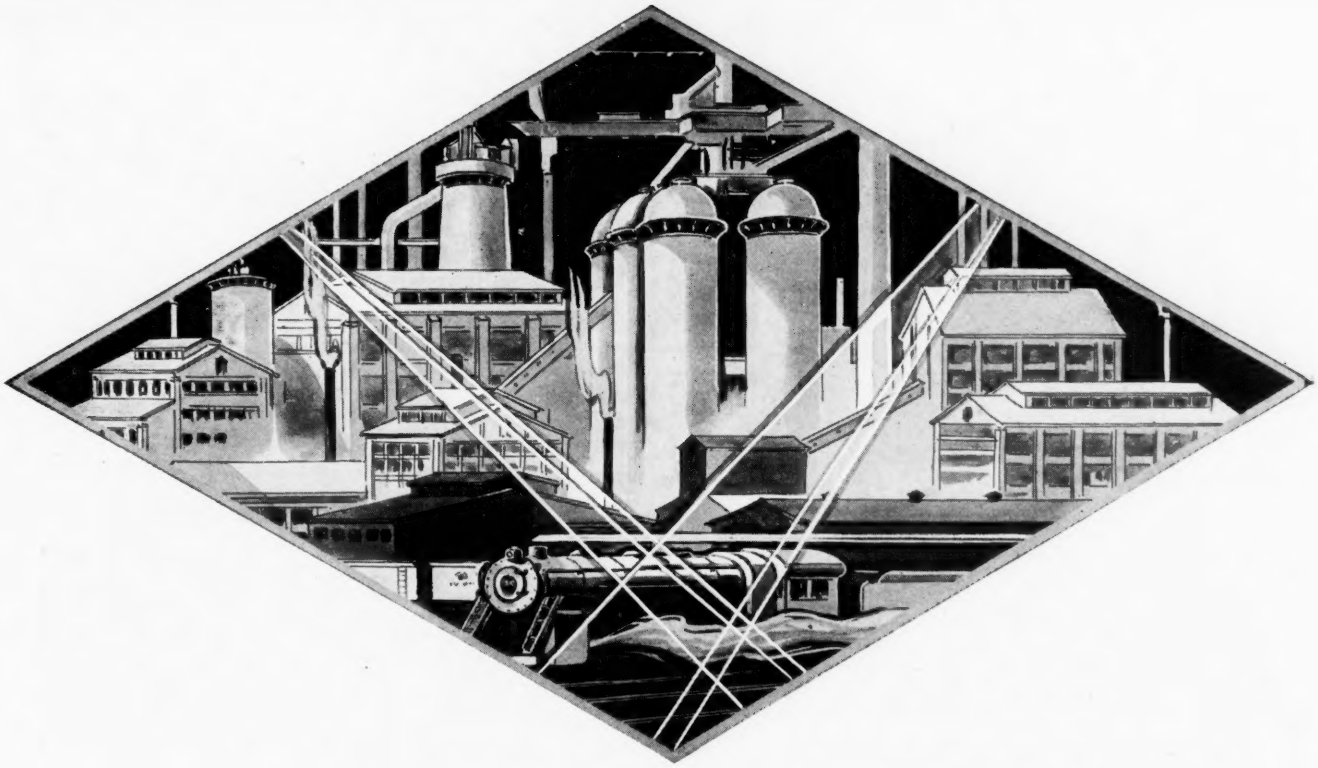

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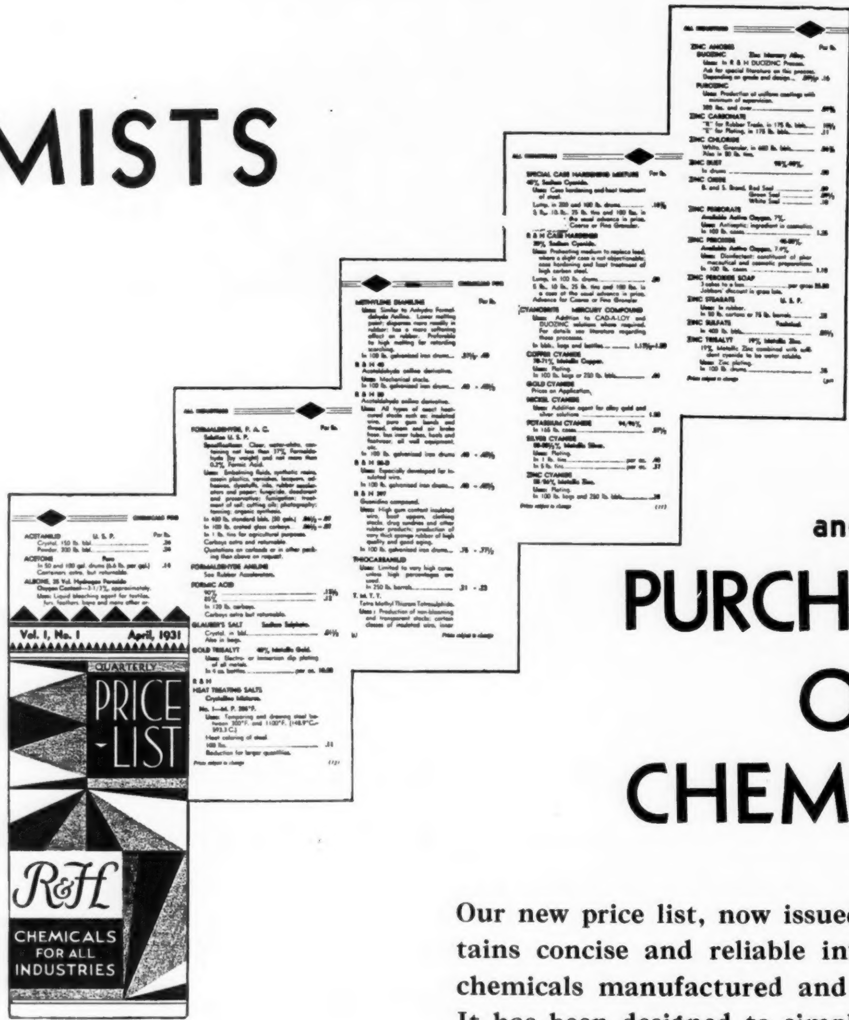

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